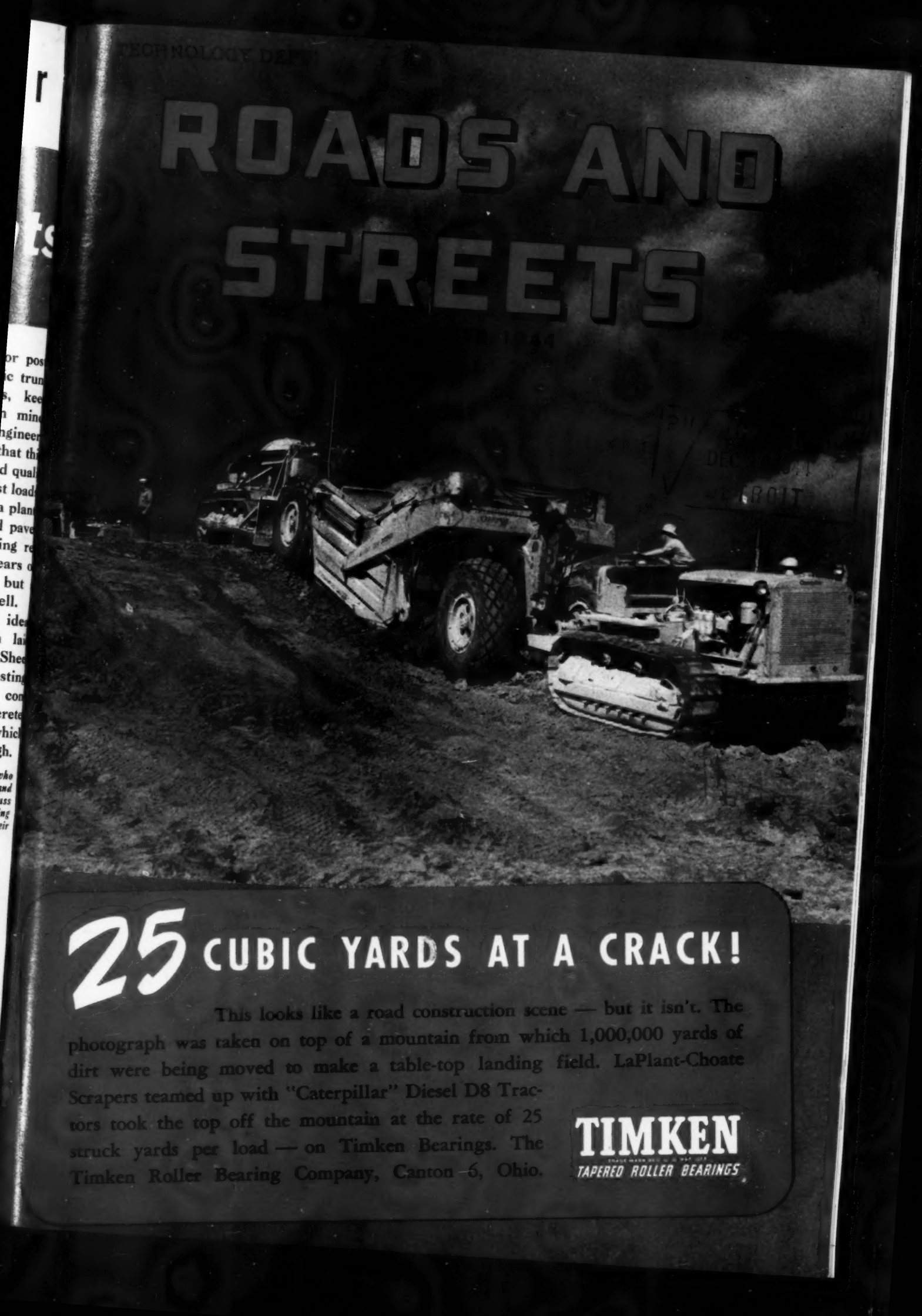



# 25 CUBIC YARDS AT A CRACK!

This looks like a road construction scene — but it isn't. The photograph was taken on top of a mountain from which 1,000,000 yards of dirt were being moved to make a table-top landing field. LaPlant-Choate Scrapers teamed up with "Caterpillar" Diesel D8 Tractors took the top off the mountain at the rate of 25 struck yards per load — on Timken Bearings. The Timken Roller Bearing Company, Canton 6, Ohio.

**TIMKEN**
TAPERED ROLLER BEARINGS

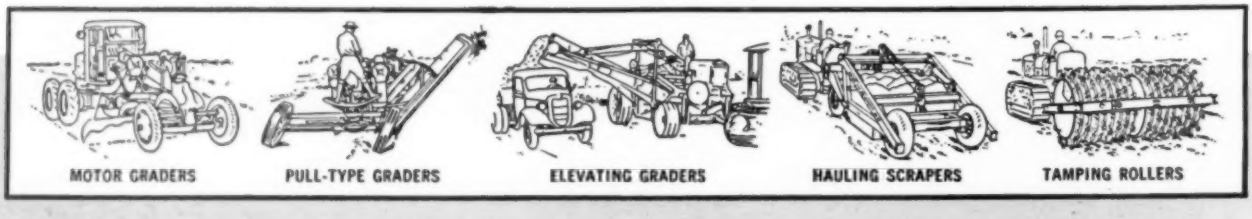
# THEY'LL SOON BE BACK *in "Civies"...*

For some three years practically every machine leaving the Adams shipping dock has been dressed in the war paint of the Army or Navy. Hundreds of Adams motor graders, leaning wheel graders, elevating graders—including specially designed pull-type graders and tamping rollers for the airborne engineers—have been shipped to all parts of the world. Reports from all sources indicate that they are doing a grand job in the building and reconstruction of air bases, landing strips, roads, etc.

In the very near future—in time for spring work—Adams equipment should again be available for delivery for civilian uses subject, of course, to whatever government restrictions are in effect at that time. In connection with your 1945 planning see your local Adams dealer now about the machines you need. He's alive to the possibilities and can be of real service to you.

**J. D. ADAMS COMPANY • INDIANAPOLIS, IND.**

At war's end we'll need many new roads and many jobs for returning service men. Plan post war projects now and meet both needs.




# ADAMS ☆ ROAD-BUILDING AND ☆ EARTH-MOVING EQUIPMENT

# Husky Wire Rope

## helps beat the calendar



By keeping your machines on the job, ready for work, you're eliminating one potential source of delays. And one of the best things to be sure about is the wire rope on power shovels, scraper wagons, 'dozers, back hoes, and similar types of equipment.

When you rig your machines with Bethlehem Purple Strand, you're giving them as fine a rope as the market offers. Purple Strand is Bethlehem's registered name for its premium-quality rope—a rope made of improved plow steel in all standard constructions. Naturally, the same construction isn't suitable for all machines; but in any case, make sure that it's rope of the Purple Strand grade.

In road-building machines having small sheaves and drums, you'll reduce "down time" by using Purple Strand Form-Set (preformed). When a rope has been preformed, it is relieved of many internal stresses that sometimes encourage bending fatigue. So, the smaller the curve or the sharper the bend, the more you need Form-Set. In such cases, the preforming process is one of your best assurances of increased rope life.

Ask a Bethlehem man for his recommendations. He's a wire-rope specialist, and his services imply no obligation.


***When you think WIRE ROPE... think BETHLEHEM***

# ROADS AND STREETS

Vol. 87, No. 12 December, 1944

ECA

*A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.*

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

HALBERT P. GILLETTE, President; EDWARD S. GILLETTE, Publisher; HAROLD J. McKEEVER, Editor; CHARLES T. MURRAY, Managing Editor; JOHN C. BLACK, Field Editor; LT. COL. V. J. BROWN, Publishing Director (Absent on Military Duty); H. J. CONWAY, Advertising Editor; L. R. VICKERS, Promotional Director.

## CONTENTS



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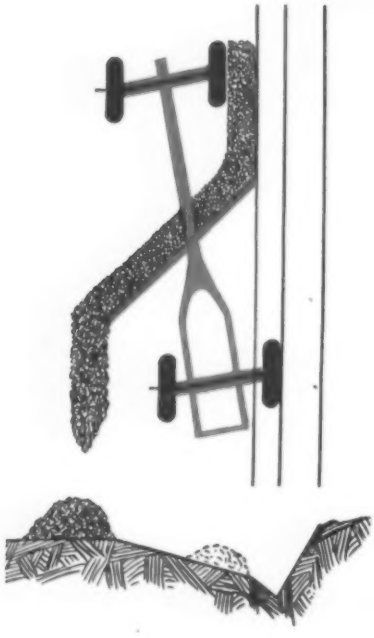
# "CONTROLLED TRACTION"



In the photograph above, and diagram at the left, the "99-M" is using "Controlled Traction" on a road grading job to move the material out of the ditch, and up the slope. This operation is always difficult, and frequently impossible, for ordinary Motor Graders.

• Whenever you see a "99-M" with its rear end offset, as in these photographs and diagrams, you can be sure that it is moving more material farther, and doing the job faster, than an ordinary Motor Grader could do it. "Controlled Traction" is the reason.

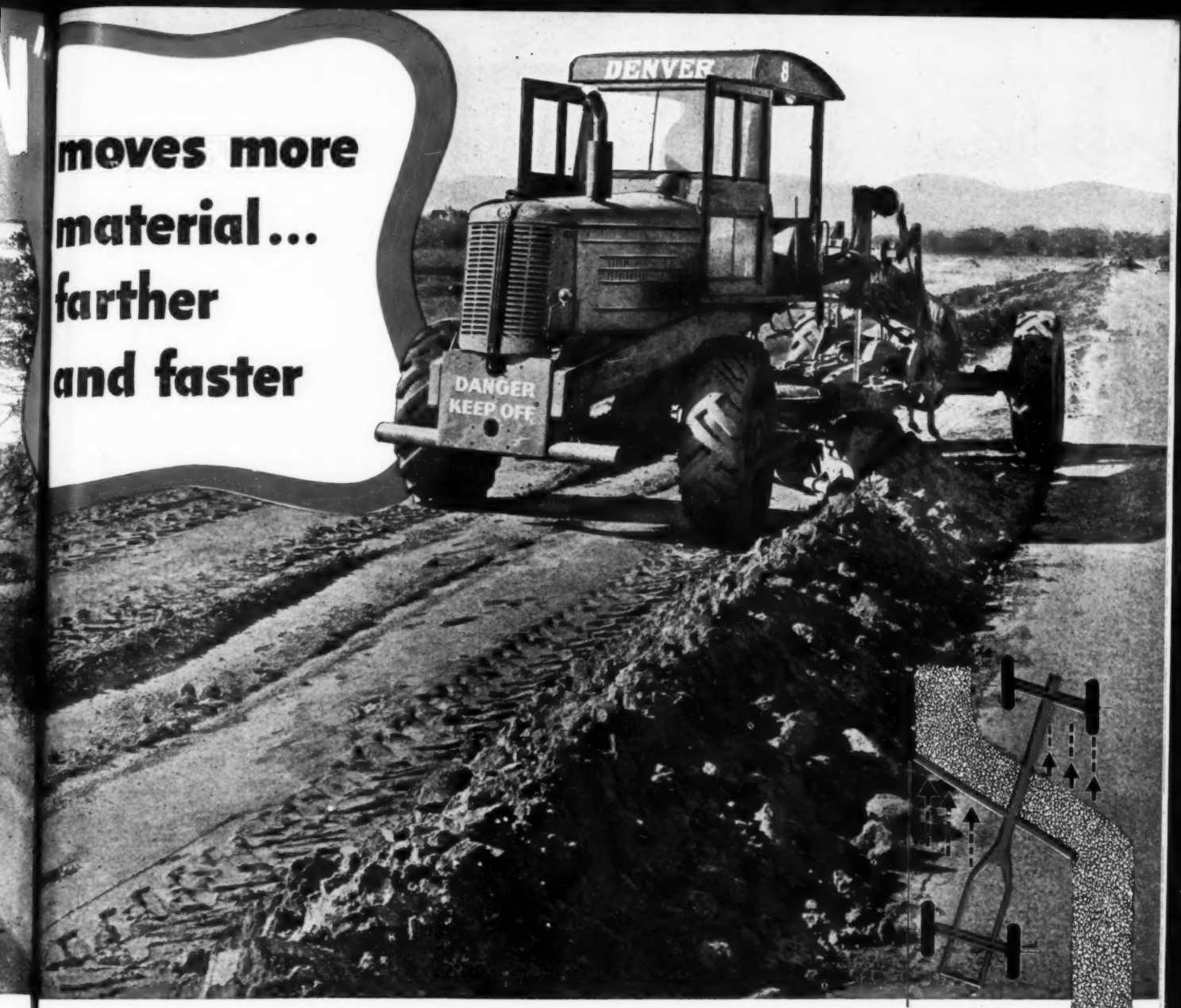
Getting down to fundamentals, the main job for any self-propelled grader is *to move a satisfactory amount of material with the blade, and at the same time keep moving in the desired direction.*

To "move a satisfactory amount of material" requires adequate traction, which is something the All-Wheel Drive "99-M" Power Grader has in abundance.

To "keep moving in the desired direction" means that there must be a way to overcome the side thrust caused by the load on the angled blade. If this control is lacking, the grader slides sideways.

CONTROLLED TRACTION involves steering the rear wheels, and angling the frame, until the combination of rear wheels pushing

# moves more material... farther and faster




behind the toe of the blade, front wheels pulling ahead of the heel of the blade, and blade practically at right angles to the frame in its angled position, *balances the load,* and makes it easy for the "99-M" to move straight ahead with a blade load that would either stall an ordinary Motor Grader, or cause it to slide sideways.

**AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.**

**In this photograph and diagram, the "99-M" is using "Controlled Traction" to handle a tremendous windrow of "oil mix," using the entire 13ft. blade, and missing the windrow with all wheels. The arrows in the diagram show how the rear drivers push behind the toe of the blade, while the front drivers pull ahead of the heel of the blade.**

BUILDERS OF ROAD MACHINERY

**Austin-Western**

SINCE 1859

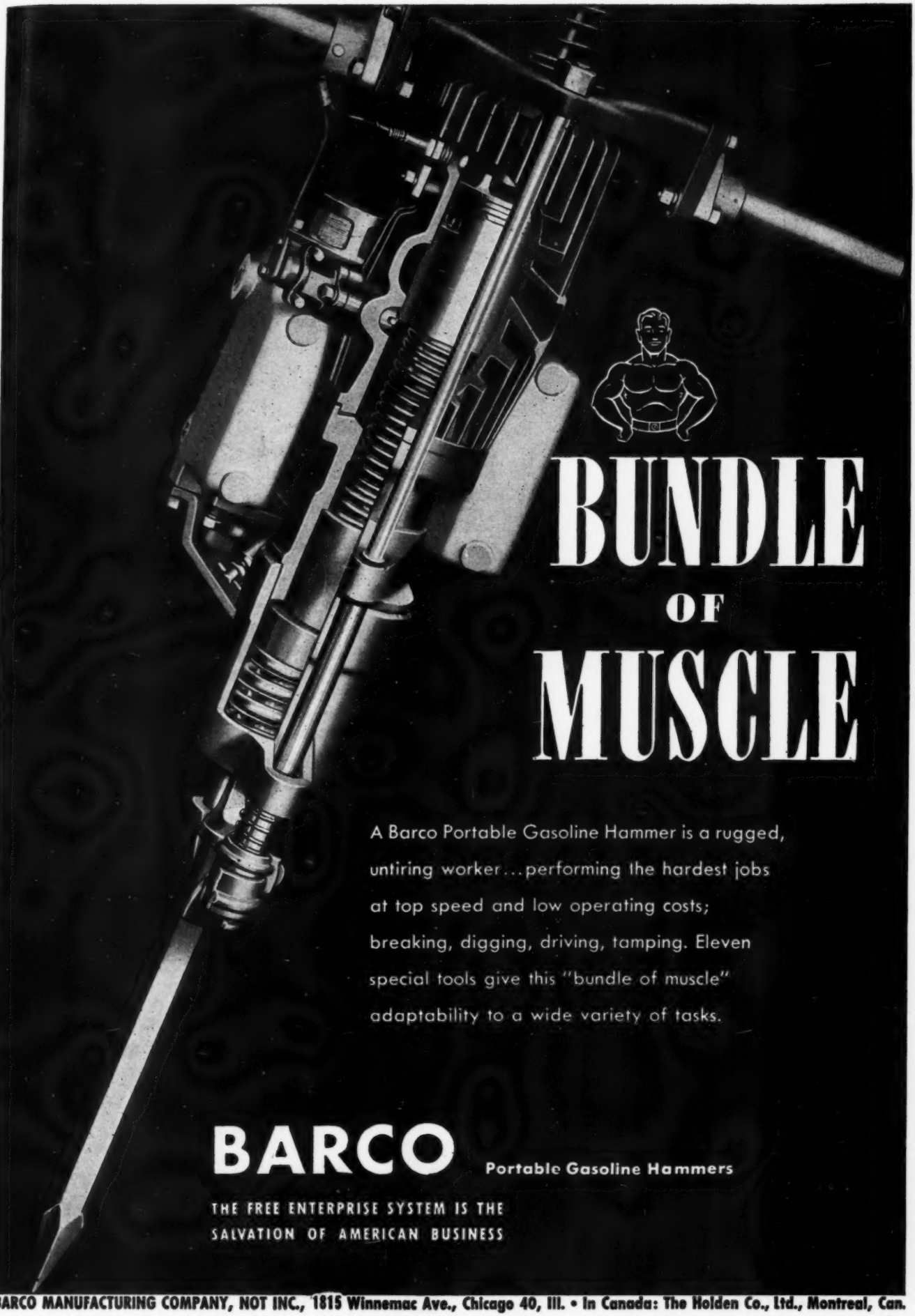
BUY MORE WAR BONDS

# You Don't Have to Baby 'Em ..but PROPER CARE is GOOD BUSINESS!

1. LOADING — Big 2½-yard T7 TRAXCAVATOR loading DW10 wagon.
2. EXCAVATING for a large building foundation with Model T7 TRAXCAVATOR.
3. ROAD WIDENING with a TRAXCAVATOR goes forward with little interruption of traffic.
4. BULLDOZERS available for all TRAXCAVATORS. Interchange quickly with the bucket.

**TRAXCAVATORS are built for hard, continuous work and will give long service with ordinary care. Records of machines on toughest jobs prove this fact, but service records likewise prove that proper lubrication and maintenance pay big dividends in longer life and lower net cost of operation. Especially in these times, when new machines are scarce and replacement parts are not always too easily obtained, it is wise to give special thought and action to maintenance. Have your Trackson-"Caterpillar" dealer inspect your TRAXCAVATORS and other TRACKSON Tractor Equipment to see that they are ready for the busier days ahead. Should you need another parts or instruction manual, ask your dealer, or write direct to TRACKSON COMPANY, Milwaukee 1, Wisconsin.**

**TRACKSON**
**TRACTOR EQUIPMENT**



# BUNDLE OF MUSCLE

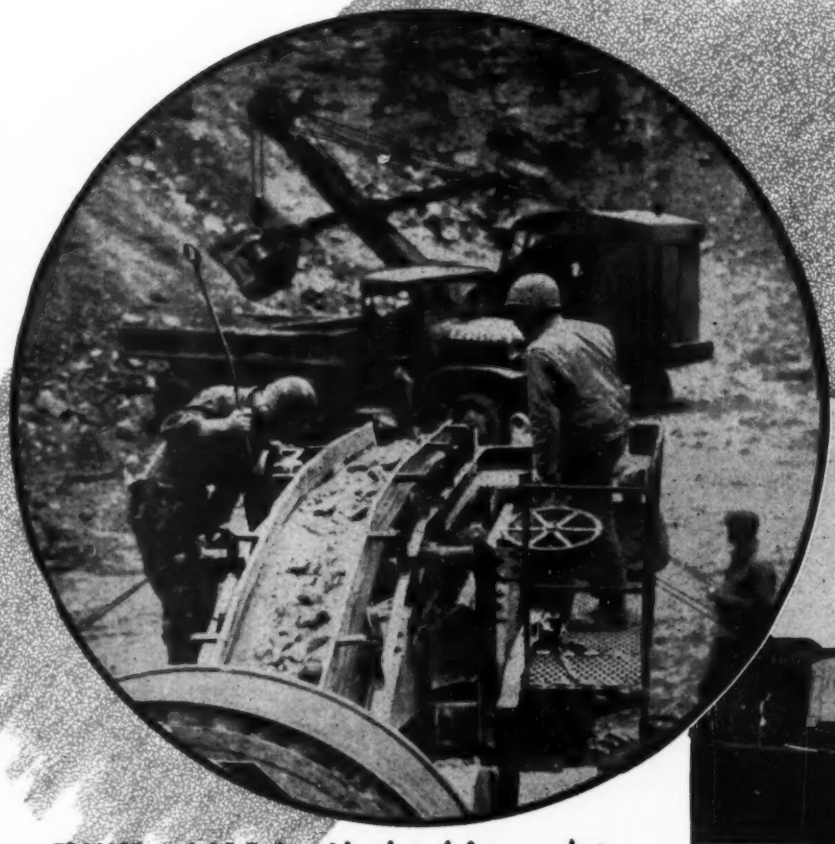
A Barco Portable Gasoline Hammer is a rugged, untiring worker... performing the hardest jobs at top speed and low operating costs; breaking, digging, driving, tamping. Eleven special tools give this "bundle of muscle" adaptability to a wide variety of tasks.

**BARCO** Portable Gasoline Hammers

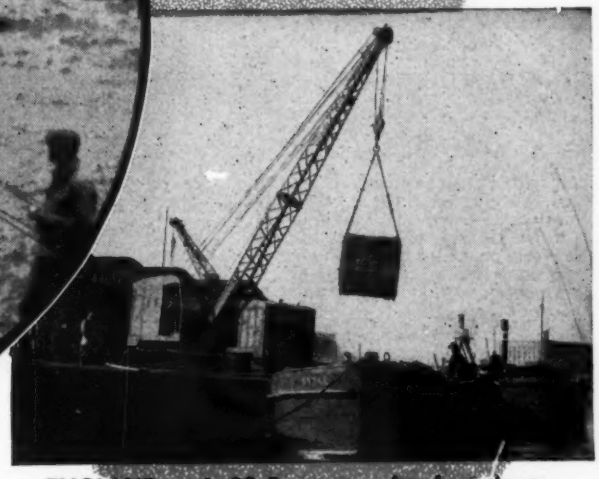
THE FREE ENTERPRISE SYSTEM IS THE SALVATION OF AMERICAN BUSINESS

BARCO MANUFACTURING COMPANY, NOT INC., 1815 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd., Montreal, Can.

# TOTAL WAR—ALLIED VERSION



FRANCE — A 15-B shovel loads rock for a crusher.
*(Signal Corps Photo)*



ENGLAND — A 22-B crane unloads rations.
*(Signal Corps Photo)*

Fine excavating equipment in the hands of skilled men — the weapon the Axis overlooked — is one of the distinguishing marks of total war, Allied version.

Leaders always, Bucyrus-Eries on all the fighting fronts are adding to the effectiveness of Allied total war. And their outstanding features of design and workmanship will put Bucyrus-Eries in the front ranks of tomorrow's reconstruction.

V-69C

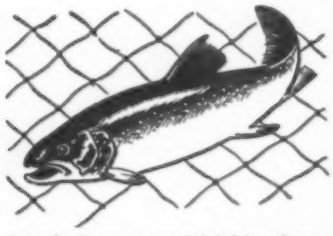
BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

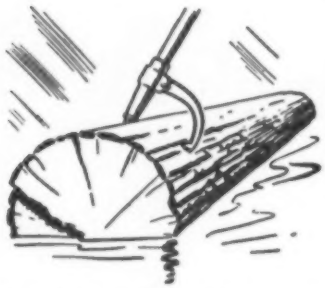
SICILY — A 15-B crane unloads landing mats
*(Signal Corps Photo)*

SOUTHWEST PACIFIC — A 37-B shovel supplies trucks with aggregate. *(Official Navy Photo)*

In the "mining" of petroleum, as in the mining of many other ores and the production of aggregates, Cummins Dependable Diesels play a vital role. They power drilling rigs, trucks, shovels, dredges and many other types of equipment . . . have established an enviable record for reliable, low-cost performance on the toughest 24-hour-a-day jobs.



America's commercial fishing boats are bringing in record catches to meet record war-time requirements for fish and fish by-products. Many of these boats are Cummins Diesel-powered because fishermen everywhere know that the best assurance of being "first out and first back" is a Cummins Marine Diesel.



Basic in war and basic in peace is the vast logging industry of the Northwest. Here, the performance of Cummins Dependable Diesels in yarders, loaders, trucks and tugs explains why Cummins Diesel power is known among loggers as "the power behind CHEAP LOGS."

In agriculture and its many allied industries, Cummins Diesel power has innumerable applications. It is widely used in the West for irrigation purposes . . . in cotton gins, flour and feed mills, ice plants, dairies and many other places where its economy and dependability have been instrumental in increasing production and also decreasing costs.

---

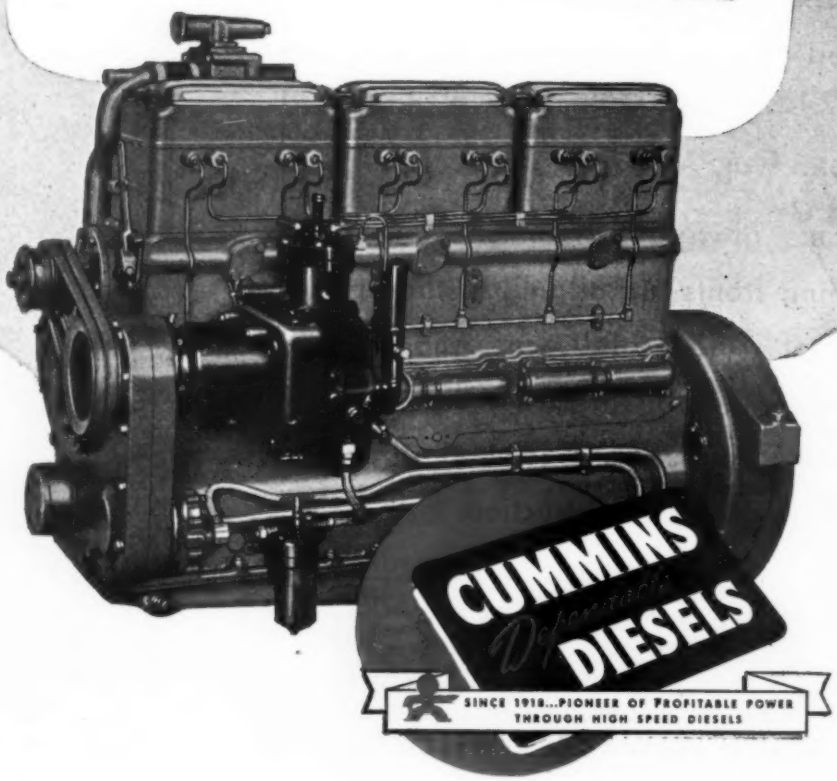
*Automotive models • marine engines for propulsion and auxiliary power • power units of all types • stationary engines • generating sets • locomotive models.*

# Backbone of every Basic Industry

In the "mother" or basic industries which produce the raw materials—agriculture, mining, commercial fishing and logging—and in the countless allied industries that play a part in the conversion of raw material into finished product, the development of the high speed diesel in 1932 went a long way toward changing modern concepts of power.

This diesel was a Cummins Diesel. Once and for all it struck away the shackles of excessive weight and size which had so long limited the use of diesel power. Once and for all it proved that diesel power could be applied to virtually any heavy-duty job and do that job—cheaper, faster, longer.

Since 1932, continued refinements in every phase of design, construction and material specification have produced still further improvements in the Cummins Diesel's operating economy . . . still further reductions in its weight and dimensions per horsepower. That's why operators and builders of all types of powered equipment—automotive, industrial and marine—have turned to Cummins for the dependable, low-cost power which is the backbone of industry. CUMMINS ENGINE COMPANY, INC., Columbus, Ind.




Pretty
but... dangerous!
Under a microscope snow flakes are beautiful, but piled or packed on the highways and in ditches they become a menace which results in miles of good road rutted and gutted by snow water from roadside snow. SNOGO can save miles of repair work.
SNOGO throws the snow OFF the road. No banks build up ever deepening, narrowing lanes that delay traffic and endanger lives. Workers get to their jobs, children to school—and back—roads are open for the fire department and the doctor, and winter business goes on better than usual.
Let us send you details to help your future plans.
KLAUER MANUFACTURING COMPANY
Dubuque, Iowa
SNOGO
A SNOGO For EVERY BUDGET

# HERE'S WORK for Your outfit . . .

ON CONSTRUCTION

ON LOGGING

ON MINING

## HERE'S HELP
**on Equipment and Manpower . .**

*Contract your Road Construction, Maintenance and Snow Plowing*

Avail yourself of contractor's men and machines. If you aren't already doing so . . . contract with construction companies to handle your road building, maintenance and snow plowing. Here is a valuable source of manpower—construction companies with experienced crews. Here is a reliable source of machine power — tractors, scrapers, bulldozers, graders — waiting to be put to work.

Now used by many public bodies, this plan brings relief to communities hit by the manpower and equipment shortage . . . enables them to build and maintain essential roads and streets. Investigate it!

Ask your Allis-Chalmers dealer to help you locate a suitable contractor.

THIS PLAN SOLVES PROBLEM FOR MONTGOMERY COUNTY, IOWA

MONTGOMERY COUNTY IS SOLVING LABOR PROBLEM

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.


▲ THIS IS READ BY HIGHWAY OFFICIALS

## HERE'S HELP
**on equipment and manpower**

**• Contract Your Logging Roads . . .**

Avail yourself of contractor's men and machines. If you aren't already doing so . . . contract with construction companies to handle your road building and other logging work. Here is a new source of manpower — construction companies with their own men. Here is a new source of machine power — tractors, bulldozers, graders, waiting to be put to work.

Indorsed and backed by the WPB, this plan will help you overcome the manpower and equipment shortage . . . help meet the war requirements of 34 billion feet of lumber for 1944. Investigate it! Let idle equipment boost your production.

Your highway officials or your Allis-Chalmers dealer will be only too glad to help you locate a suitable contractor.


▲ THIS BY LOGGERS

## HERE'S HELP
**on equipment and manpower**

**•Contract Your Stripping and Mining Roads . . .**

Avail yourself of contractor's men and machines. If you aren't already doing so . . . contract with construction companies to handle your road building, stripping and other mining work. Here is a new source of manpower — construction companies with their own men. Here is a new source of machine power — tractors, bulldozers, graders, waiting to be put to work.

Indorsed and backed by the WPB, this plan will help you overcome the manpower and equipment shortage . . . help meet the war requirements for ore. Investigate it! Let idle equipment boost your production.

Your highway officials or your Allis-Chalmers dealer will be only too glad to help you locate a suitable contractor.

ALLIS-CHALMERS

▲ THIS BY MINERS

**PAVING THE WAY**

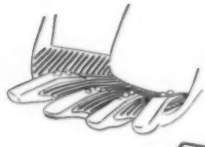
Appearing in magazines reaching the proper fields . . . these ads will help keep your organization busy.

**If you have equipment and manpower at your disposal . . . why not contract with highway officials, loggers and miners to handle their work? Many are in desperate need of help! Your assistance will contribute greatly to the war effort . . . at the same time you will keep your crew intact. To assist in bringing you together, the above series of advertisements is appearing urging the use of the contract system in various fields. Let your Allis-Chalmers dealer serve as your contact man.**

**ALLIS-CHALMERS**
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

# Fight power shovel wear with STOODY SELF-HARDENING

**BUCKETS** ▶



• If you're handling coarse materials, apply Stoody Self-Hardening in stringer beads parallel to flow of material. Deposit stringers in checkerboard patterns for maximum resistance to abrasion from fine, loose earth.

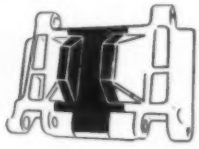
**BUCKET TEETH** ▶

• Avoid solid deposits of Self-Hardening on bucket teeth. Stringers in various patterns give excellent protection when deposited parallel to or at slight angle to tooth travel.

**TRACK ROLLERS** ▶

• Maintain track roller size by protecting rim with a single coat of Stoody Self-Hardening. Keeps shovel weight on rollers where it belongs, lowers wear on other track parts because of lower coefficient of friction and reduced track slapping.

**TRACK PADS** ▶



• Stoody Self-Hardening keeps lugs out to size, retards wear on roller path, assures more accurate mesh with tumbler lugs, and reduces track-throwing due to worn track assemblies.

**DRIVE TUMBLERS and IDLERS** ▶

• Stoody Self-Hardening maintains shape and dimensions of drive tumbler lugs, reduces abrasion and friction against track parts . . . lowers tendency of idlers to wear flat spots when working in fixed positions.

**WHEREVER SHOVEL WEAR OCCURS, you'll get maximum protection with Stoody Self-Hardening because it gives double the wear of ordinary manganese electrodes, bonds firmly with manganese steels, and resists chipping even under the terrific impact encountered on bucket parts.**

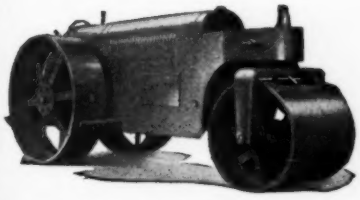
**Stoody Self-Hardening is priced at only 50c per pound, f.o.b. Whittier or distributors' warehouse. Available through 600 U. S. distributors. Stoody's Specification Sheets give detailed hard-facing information on all types of heavy, earthworking equipment. Your copy is free—write today.**

**STOODY COMPANY**
**1125 WEST SLAUSON AVE., WHITTIER, CALIFORNIA**

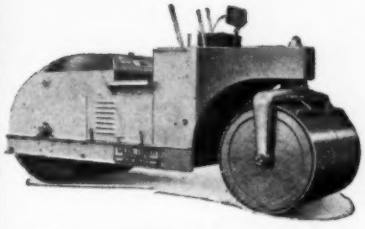
## STOODY HARD-FACING ALLOYS

*Retard wear . . . Save Repair*

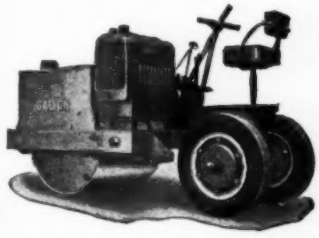
ALSO



3-WHEEL ROLLERS



TANDEM ROLLERS



PORTABLE ROLLERS

# IF IT'S A GALION–THEN

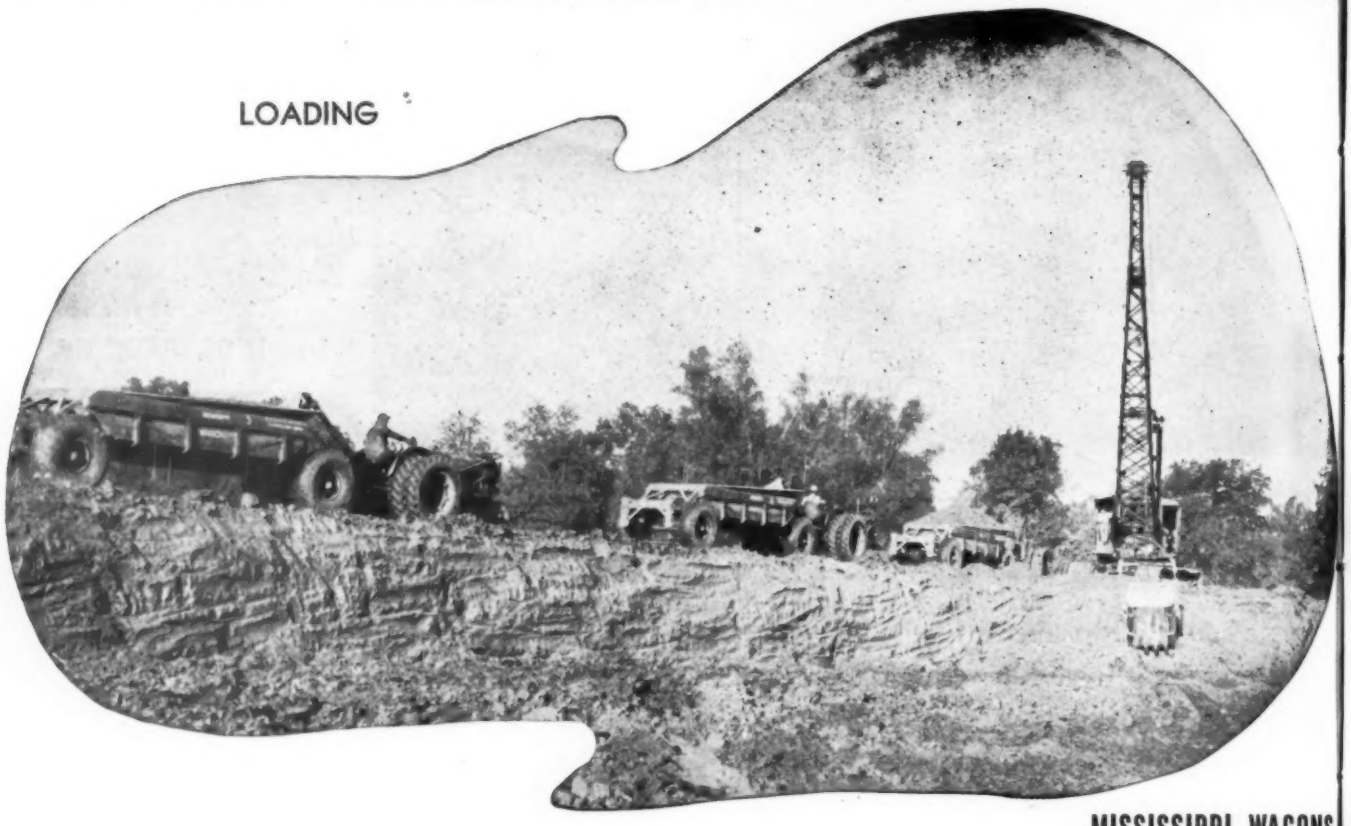
you are a jump ahead of the gun on that road and airport construction. No finer proof of the ability of Galion graders and rollers to take a lot of punishment will be found than right on the fighting fronts in this war. A war of movement . . . speed being the order of the day. Roads and airports are rushed to completion. Galion graders and rollers answer the need for efficient units to back up our fighting men. Galion is in there fighting, too. For war or peace . . . be sure it's a Galion.

## THE GALION IRON WORKS & MFG. CO.

Main Office and Works: GALION, OHIO

Galion No. 101 Motor Grader

# A VETERAN LEVEE CONTRACTOR TELLS WHY HE PREFERS MIS




MISSISSIPPI WAGONS AT WO

## "THE NICEST OPERATING EQUIPMENT I'VE EVER HAD THE PLEASURE OF BEING AROUND"—SAYS T. H. STOUT, CLEVELAND, MISS., CONTRACTOR

Mr. T. H. Stout, of the Stout & McDearman Construction Company, Cleveland, Miss., has been in the contracting business since 1927, chiefly on the treacherous Mississippi River levee. After starting his current levee jobs with ten hauling units of the conventional type, he purchased seven MISSISSIPPI WAGONS to complete the task.

Here are some of Mr. Stout's statements with reference to the detailed performance of MISSISSIPPI WAGONS on their 930,000 yard levee jobs:

"Our seven MISSISSIPPI WAGONS have enabled us to haul much more dirt and at the same time reduce our direct expenses $600 per week, largely due to these facts:

"The seven MISSISSIPPI WAGONS are using only 62 gallons of motor oil every 161 hours, including two oil changes.

"MISSISSIPPI WAGONS are using 35 per cent less Diesel fuel per unit, holding fuel cost to a minimum.

"We are loading with a three and one-half yard dragline and it takes three full buckets to load one of the units to capacity.

"It requires only six of our MISSISSIPPI WAGONS to take the capacity output of our three and one-half yard dragline on the longest hauls.

"MISSISSIPPI WAGONS are snappy, speedy. Our haul averages 5,000 feet round trip, including climbing to the top of the levee loaded. A MISSISSIPPI WAGON makes a complete round trip every 6½ minutes, with one minute loading time.

"Repair costs are so extremely low, there can be no doubt the amount necessary to keep them in good repair will be exceedingly small.

"MISSISSIPPI WAGONS do not cut up the haul road to any great degree, due to the proper distribution and proper flotation of weight. This results in at least a 40 per cent saving in upkeep on the haul road.

# MISSISSIPPI WAGONS

DUMPING

HAULING

AT WORK ON THE MISSISSIPPI RIVER LEVEE NEAR ROSEDALE, MISS.

## SPECIFICALLY RECOMMENDS MISSISSIPPI WAGONS BECAUSE:

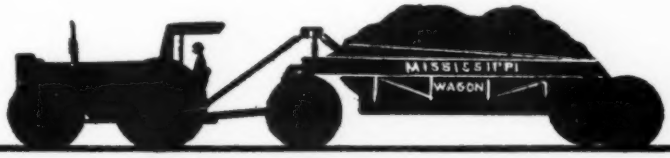
1. The low first cost.
2. Exceedingly low repair costs.
3. The great advantage given them by the weight transferring feature, enabling the operator to get the traction needed during bad going, but not making the tractor pay the penalty of the pounding and surging of the loaded trailer during the high speed portion of the cycle.
4. It's impossible for large chunks of gumbo to wedge in the body, due to the fact the side walls are straight up and down.
5. The speed and snappy performance of MISSISSIPPI WAGONS which enables a contractor to get a job done in the shortest possible time.
6. The operator is assured comfort by the low pressure used in the tractor drive tires and the very comfortable seat equipped with a shock absorber.
7. The operator's safety is assured by: (a) the excellent brakes on the tractor and trailer; (b) the low center of gravity permits operating on steep levees without turning over. These features are most important in our operation as levee work is always on rough slopes of various degrees.
8. And finally, the low cost of repair parts when repairs are necessary. The entire transmission parts cost only $195.54; the working parts of the entire rear axle and differential cost only $172.33.

---

M-R-S Manufacturing Company takes pride in adding another satisfied customer using MISSISSIPPI WAGONS to its list. You can get ready now for that tough postwar period by purchasing MISSISSIPPI WAGONS—

**"the world's most modern hauling units."**

Contact your nearest International Industrial Power distributor or write us for complete details.




**M-R-S MANUFACTURING CO.**
**JACKSON, MISSISSIPPI**

# TYPICAL DIESEL LUBRICATION PROBLEMS:

## 5. Liner Wear

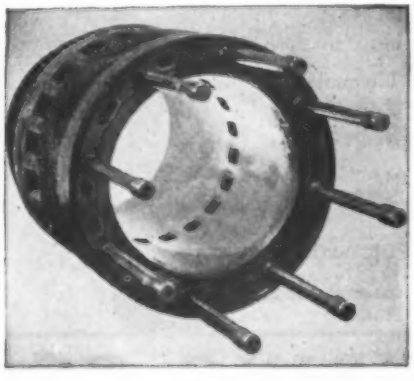
Wear on Diesel liners is commonly concentrated in the high-temperature belt near the combustion chamber. This is largely attributable to the inherent inability of most lubricating oils to "wet" hot metal surfaces.

Unlike spark ignition engines in which a partial vacuum in the combustion space during the intake stroke assists in drawing oil toward the upper compression rings, Diesels operate at or above atmospheric pressure in the combustion space which tends to drive oil away from the rings.

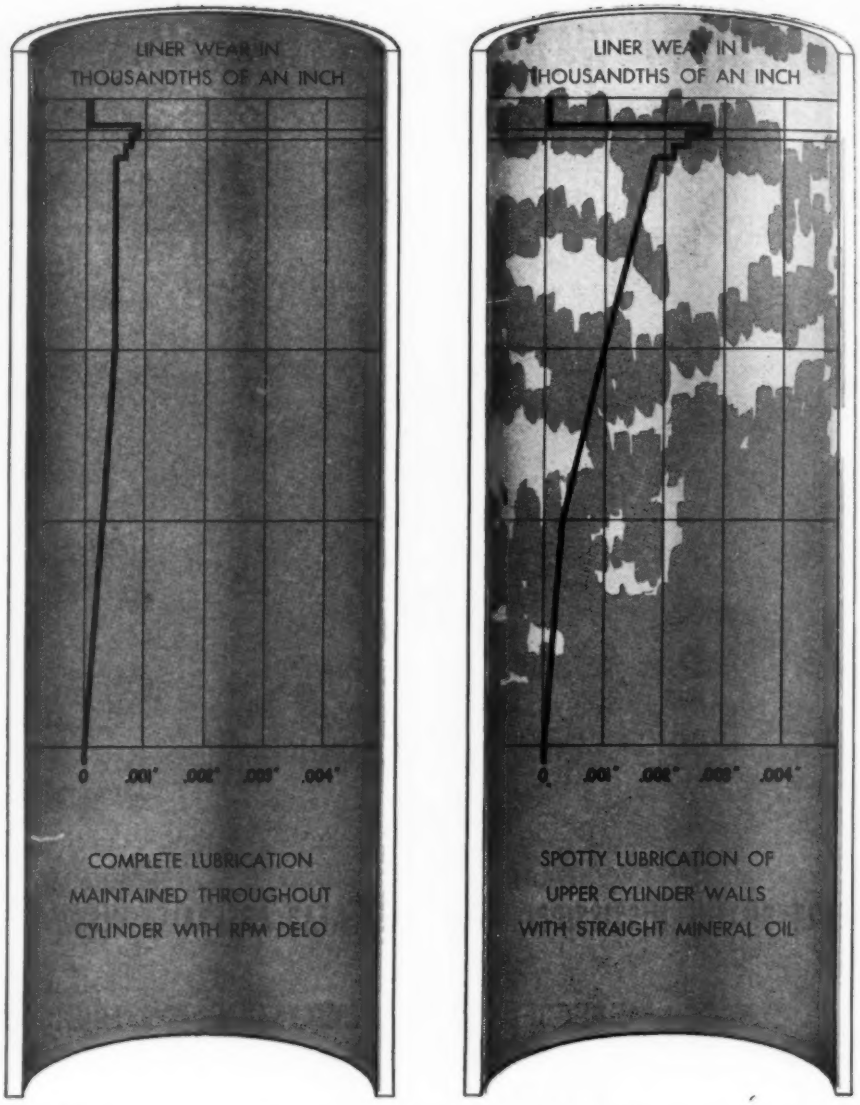
It is imperative then—to prevent relatively dry operation in the top piston ring high-temperature area—for the lubricant to have high-temperature adhesion characteristics.

To achieve this high adhesion factor under all operating conditions in RPM DELO Diesel Engine Lubricating Oil, a special compounding material was added. With this additive, RPM DELO will not run away from hot surfaces, thus preventing metal-to-metal contact on hot-running engine parts.

A typical example of the effectiveness of RPM DELO in preventing liner wear is offered by the Chicago, Rock Island and Pacific Railroad. One of its "Rocket" Diesel powered locomotives ran 157,076 miles on RPM DELO without an oil change, with liner wear of only .001 in.



**Liner from** Rock Island "Rocket" engine showing wear of only .001 in. after 157,076 miles on RPM DELO without an oil change.




**These charts** of one of the tests required by the Army in certifying oil for use in combat equipment, graphically illustrate (right) marked increase of liner wear in upper cylinder zone due to inability of straight mineral oil to provide full lubrication of this high-temperature area; and (left) reduction of liner wear by ability of RPM DELO to stick to these hot spots.

Other causes of liner wear minimized by RPM DELO include:

1. Corrosion caused by carbonic and other acids at low temperatures.
2. Scuffing of liners from rocking of piston rings in worn grooves.
3. Scoring and scratching of liners due to stuck piston rings.

Reducing liner wear to a remarkable degree is but one of RPM DELO's advantages in solving Diesel engine maintenance problems. Its other properties include: The ability of RPM DELO to eliminate ring sticking, to stop excessive deposits on rings and ports, and to prevent bearing corrosion.

RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial RPM DELO (concentrate). Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.

RPM DELO

*Write on your letterhead for free booklet on* RPM DELO, *Standard of California, Dept. T-12, San Francisco, California*

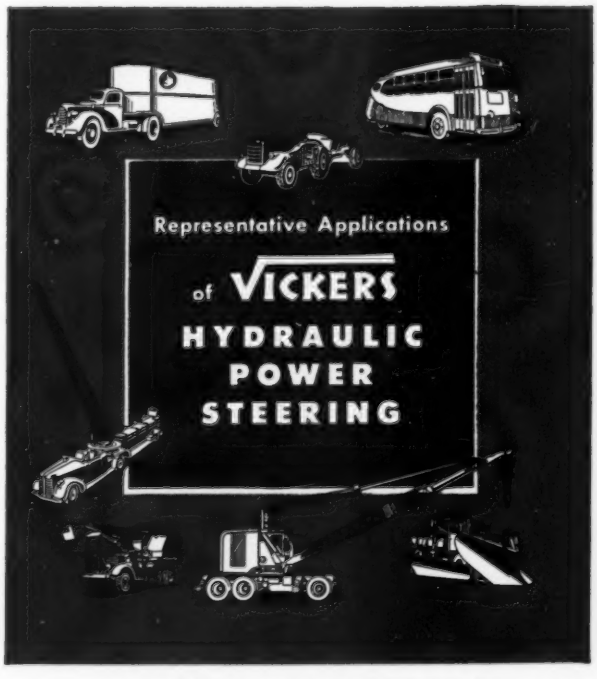
**STANDARD OF CALIFORNIA**


# RUGGED...

## Another Feature of VICKERS HYDRAULIC POWER STEERING SYSTEM

Providing effortless, positive, and shockless steering of even the heaviest vehicles, Vickers Hydraulic Power Steering has been in use under the most adverse operating conditions for the last 14 years. The hydraulic system is protected against overload by the relief valve which limits the maximum hydraulic pressure of the system. The pump and booster are thus protected against damage from excessive pressure and the linkage system from abuse. With Vickers Hydraulic Power Steering, road shock thrusts are transmitted to the frame of the vehicle instead of to the steering gear.

Among the many other advantages of Vickers Hydraulic Power Steering are: greater driver efficiency by reducing fatigue to a minimum, easy application to existing chassis designs, wheel "fight" is impossible, greater road safety, and automatic lubrication. Ask for new Bulletin 44-30 for all the facts about the Vickers Hydraulic Power Steering System.

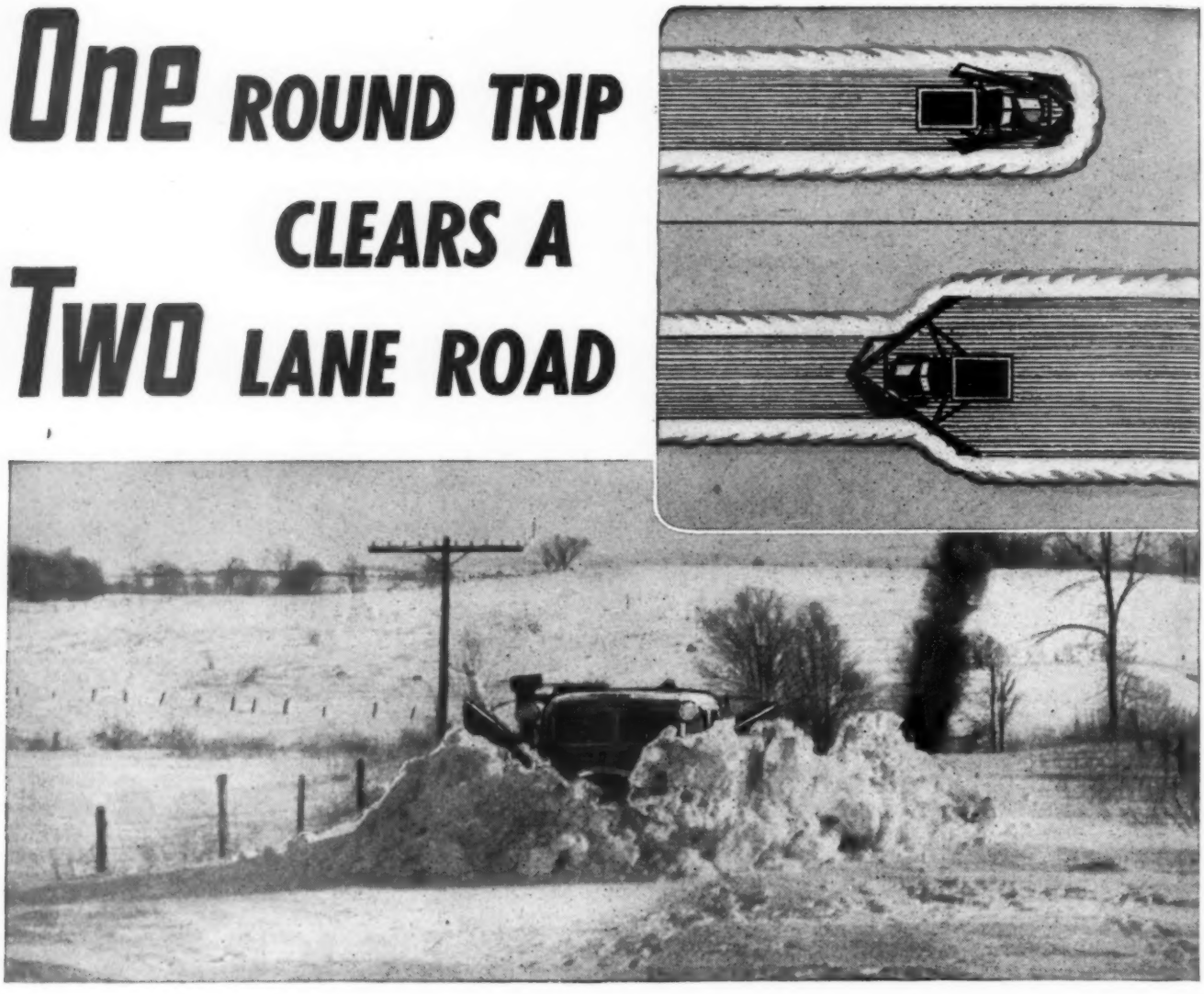



**VICKERS** *Incorporated*

1432 OAKMAN BLVD. • DETROIT 32, MICHIGAN

*Application Engineering Offices:* CHICAGO • CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD
TULSA • WORCESTER

# One ROUND TRIP CLEARS A Two LANE ROAD



You'll revise your estimates of equipment performance when you see the Walter 250 h.p. Snow Fighter in action! Measuring 28 ft. across with both wings down, this rugged unit pushes steadily through deep drifts on its opening run—returns with wings set to the widening position, to clear the roadway completely ***in one round trip!***

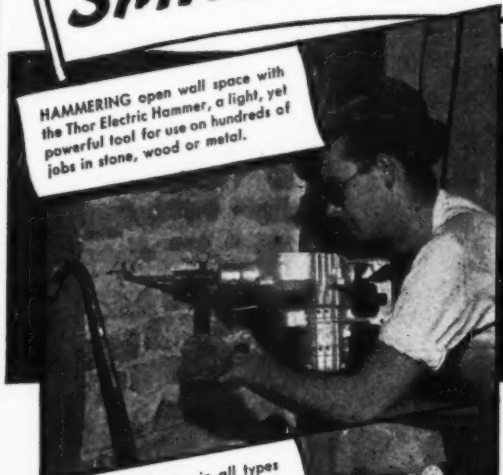
Super power and traction enable the Walter 250 h.p. Snow Fighter to mount the biggest, most efficient plowing equipment—give it the speed to clear more miles of snow per hour. Snow is removed before it packs and freezes into dangerous ruts. Main highways are completely widened-out in time to clear more miles of secondary roads. Cost-per-mile comes down as snow-removed-per-hour goes up!

Unmatched tractive power is supplied by the exclusive Walter Four-Point Positive Drive. Power is proportioned to each of FOUR driving wheels according to its traction at any instant. No wheel-spinning, side-slipping, or stalling to reduce speed of clearance. There's a Walter Snow Fighter to fit every snow removal need, every snow removal budget. Write today for the complete story.

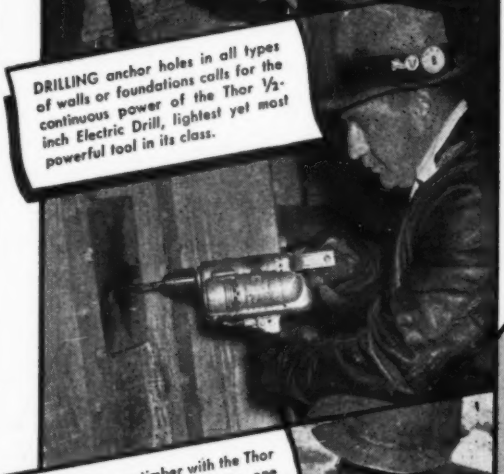
**WALTER MOTOR TRUCK COMPANY**
1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.

# SMALL TOOLS do BIG JOBS!

## Save Time and Cut Costs . . . with Thor TOOLS In Scores of Ways!



HAMMERING open wall space with the Thor Electric Hammer, a light, yet powerful tool for use on hundreds of jobs in stone, wood or metal.



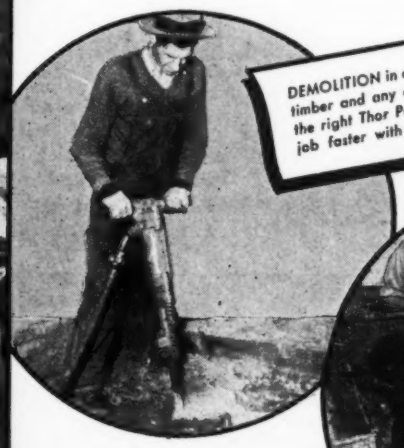
DRILLING anchor holes in all types of walls or foundations calls for the continuous power of the Thor ½-inch Electric Drill, lightest yet most powerful tool in its class.

SAWING heavy timber with the Thor 12-inch diameter Electric Saw, one of five available models for faster, safer work on heavy duty jobs.

DIGGING in clay, gravel, hard pan, frozen ground—in every heavy formation, is the job of the Thor Clay Digger, plus fast work also as a light demolition tool, pickhammer, or the like.

Designed and compactly built to minimum weight for *fast, easy handling,* Thor portable pneumatic and electric tools also pack the *power* that gets scores of construction jobs done faster . . . at less cost!

There's one of these *faster-working* Thor tools for every type of construction job—demolition, digging, hammering, sawing, drilling, nail driving, cutting, pumping and many others.



DEMOLITION in concrete, asphalt, stone, timber and any other material finds just the right Thor Paving Breaker to do the job faster with less air and time cost.

TAMPING with the Thor Backfill Tamper means putting the fill firmly into place to stay . . . no coming back on the job several times to backfill.

**. . . Plus**

**ALL These Other Thor Tools For Fast, Money-Saving Construction**

**GRINDERS • WOOD BORERS • ROCK DRILLS**
**SUMP PUMPS • ACCESSORIES**
**For All Pneumatic and Electric Tools**

Write today for information on how small Thor Tools can help you work faster, at less cost, plus other valuable tips, in Catalog 42-A.

Thor *Portable Pneumatic and Electric Tools*

**INDEPENDENT PNEUMATIC TOOL COMPANY**

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

*Branches in Principal Cities*

# *It takes a TOUGH Air Compressor for jobs like this!*

In tough construction jobs, where compressed air is needed and the going is rough, use a Schramm Air Compressor.

Ruggedness of construction—yet light in weight—is a big feature of the Schramm Compressor . . . a feature that enables you to easily move it about, going into even rough-and-tumble places—and all the while furnishing as much compressed air as you want!

Schramm Compressors—both stationary and portable—are completely water-cooled—compact—sturdy! For *any* compressed air job use a Schramm. Detailed information is in our illustrated Bulletin EC-44, yours for the asking.

**SCHRAMM INC**

**THE COMPRESSOR PEOPLE**
**WEST CHESTER**
**PENNSYLVANIA**


VALVE troubles result in excessive consumption of lubricating oil, rough running and stalling engines, hard starting. As a rule, most of these valve troubles are caused by mechanical difficulties, although some result from slow speed operation, permitting excessive deposits.

**CHIEF CAUSES OF VALVE FAILURE**

1. *Insufficient Tappet Clearance* . . . Correction lies in more frequent tappet inspection and accurate clearance adjustment.

2. *Valve Face or Seat off Center* . . . This trouble may result in heavy gum and coke deposits piling up on under side of valve head and forcing it off seat. Here correction lies in proper valve grinding, or replacement.

3. *Warped Valves* . . . Valves that are warped will apparently hang open at high speeds while clearing at idle. Reseating or replacement is only correction. Reducing abnormal temperatures will likely prevent repetition.


4. *Weak Springs* . . . Replace with springs meeting manufacturer's specifications for spring tension.

5. *Worn Valve Guides* . . . Guides become worn from dirt in air intake or oil resulting in coke or gum deposits that build up on valve stems because of excessive oil. This may be corrected by more frequent service of air cleaner or installing more efficient air cleaner; and replacement of worn guides.

6. *Deposits on Valve Seat* . . . This is the most frequent cause of leaky valves with consequent loss in power and fuel efficiency. Source of this trouble is usually heavy carbon or lead deposits in combustion chamber, very rarely from foreign matter within combustion chamber. Narrower valve seats and strong springs with more accurate grinding technique are remedies.

7. *High Temperature Exhaust* . . . Caused either by back pressure due to restricted exhaust system or poor carburetion or late timing. This condition results in warped valves and assists in building up varnish, lacquer, gum or deposits on valve stems, resulting in sticky and/or leaky valves. Cure is to clean out or replace muffler and tail pipe and improve combustion.

8. *Insufficient Cooling* . . . Caused by scale, rust or muddy deposits in water jackets; failure of water pump to deliver enough water; bad vanes in pump; slipping pump belt. In all cases cleansing or repairing of cooling system is called for.

**MAIN CAUSES OF STICKY INTAKE VALVES**

Intake valves rarely fail or burn because they are constantly cooled by incoming charge of air-fuel mixture. However, they do frequently stick, due to:

1. *Gum Content of Fuel too High* . . . Gum in fuel forms deposits around valve stem above guide and under valve head. To correct, change to fuel of proper specification.

2. *Worn Guides and Stems* . . . Since most of stem and guide wear is due to dirt and dust in air, remedy is more frequent service of air cleaner, or installation of larger capacity oil bath cleaner and, of course, replacement of worn guides and valves.

**RING-FREE MOTOR OIL HELPS REDUCE VALVE TROUBLE**

*Correction of valve trouble is obviously a mechanic's problem. However, motor oil that penetrates fast—gets down around valve stems, and guides—reduces friction, and thereby prolongs life of valve. Macmillan Ring-Free Motor Oil has this quality of fast penetration. Furthermore, it is refined to withstand high engine temperatures. Ring-Free acts as a preventive for valve sticking, saving fuel consumption and costly repair bills.*

**FREE BOOKLET**

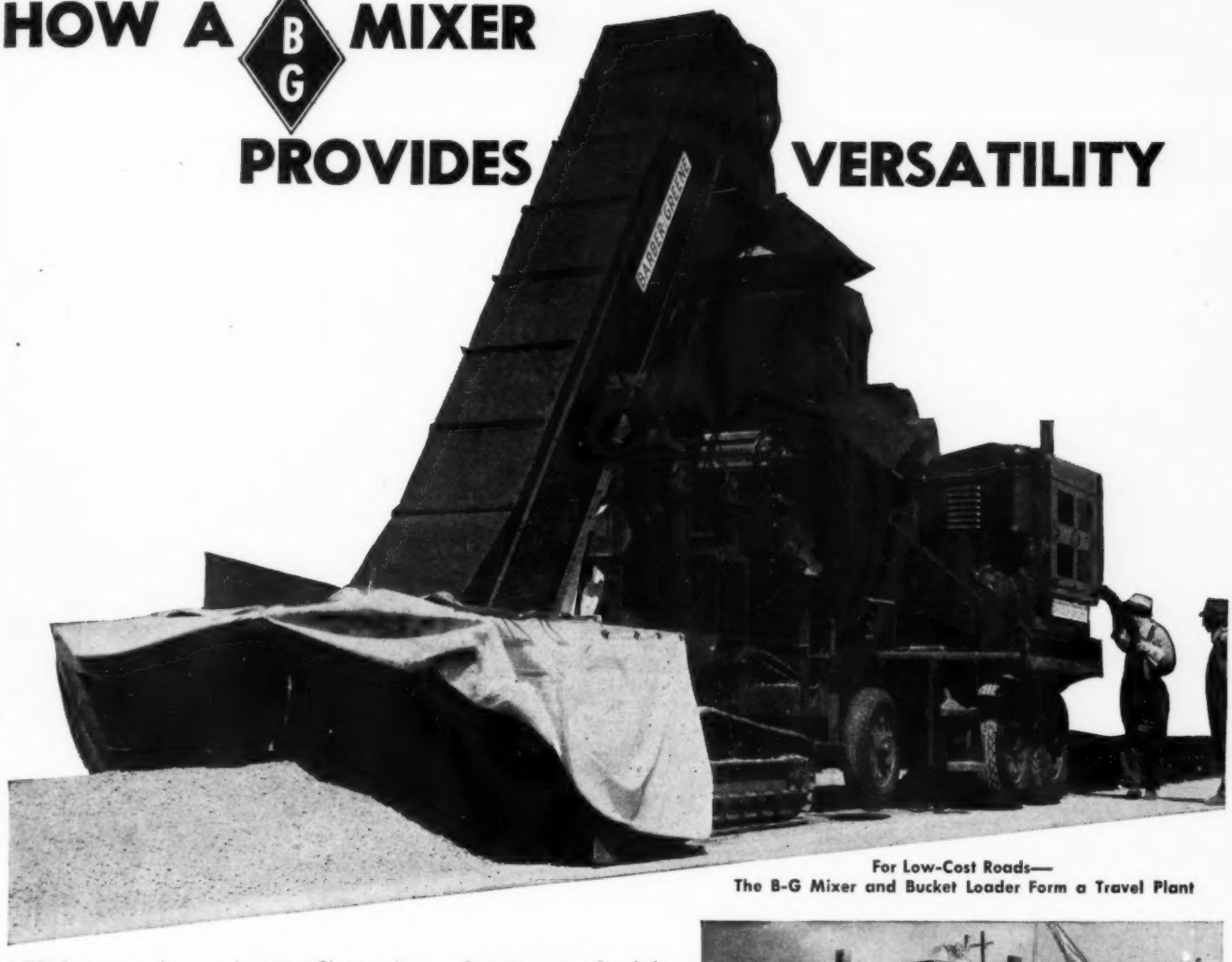

Write today for copy of free pamphlet on "Sticky and Burned Valves—Causes and Preventions." Address—Macmillan Petroleum Corporation, Room 1008, 530 W. 6th Street, Los Angeles 14, Calif.

MACMILLAN RING-FREE MOTOR OIL

MACMILLAN RING-FREE MOTOR OIL

MACMILLAN PETROLEUM CORPORATION—50 WEST 50TH STREET, NEW YORK 20 • 624 SOUTH MICHIGAN AVENUE, CHICAGO 5 • 530 WEST SIXTH STREET, LOS ANGELES 14 • COPYRIGHT 1944, MACMILLAN PETROLEUM CORPORATION

# HOW A B-G MIXER PROVIDES VERSATILITY



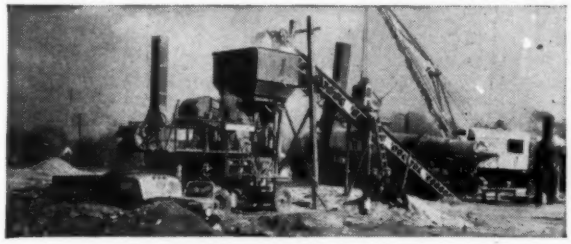

For Low-Cost Roads—
The B-G Mixer and Bucket Loader Form a Travel Plant

● High-type mix . . . intermediate mix . . . low-cost road mix! There is a combination of B-G units to make a plant set-up for producing bituminous mixtures under any specification, without employing unnecessary, costly units.

Just couple the Mixer to a B-G Bucket Loader and you have a travel plant that injects high quality into low-cost roads—an outfit that maintains a steady output of *plant-mixed* material mile after mile.

For the production of a wide range of intermediate bituminous mixes, team up the same B-G Mixer with a Dual Drum Dryer. To the accurate proportioning of the Mixer is now added drying to the previously-sized aggregate.

When high-type mixes are needed, add a B-G Gradation Control Unit to the same Mixer and Dryer. Now the plant gives you complete control of aggregate sizing, gradation and moisture control . . . meets most rigid specification requirements . . . yields a constant stream of absolutely uniform mix. For complete information on this versatile equipment, write the Barber-Greene Company, Aurora, Illinois.



For Intermediate Mixes—
The B-G Mixer Is Teamed Up With a Dual Drum Dryer

For High-Type Mixes—
To the Mixer and Dryer Is Added the B-G Gradation Unit

44-12

**Barber-Greene** B G *Constant Flow Equipment*

# WARD LaFRANCE TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

ELMIRA NEW YORK

MEMORANDUM TO THE ADVERTISING AGENCY

FROM: A. Ward LaFrance, Vice President
Great American Industries, Inc.

SUBJECT: WARD LA FRANCE TRUCKS FOR FLEET OWNERS

As you know, there are some interesting, perhaps revolutionary, ideas under development here at our Elmira plant, and I know you can't wait to tell prospective users about them. That is understandable. But please keep this clearly in mind:

Motor truck fleet owners are practical people. They are badly in need of replacement vehicles, and they are interested in the proved ideas which can be incorporated in trucks We have some fundamentally important things to tell these gentlemen, so let's not waste paper on gaudy promises and fanciful pictures of beautiful, streamlined dreams of postwar models.

Let's try to get the fact across that Ward LaFrance trucks have a twenty-five year reputation for being good trucks. Let's admit frankly that Army Ordnance engineers have increased our know-how and made it possible for us to build still better ones after the last M-1 Heavy Wrecker has been delivered.

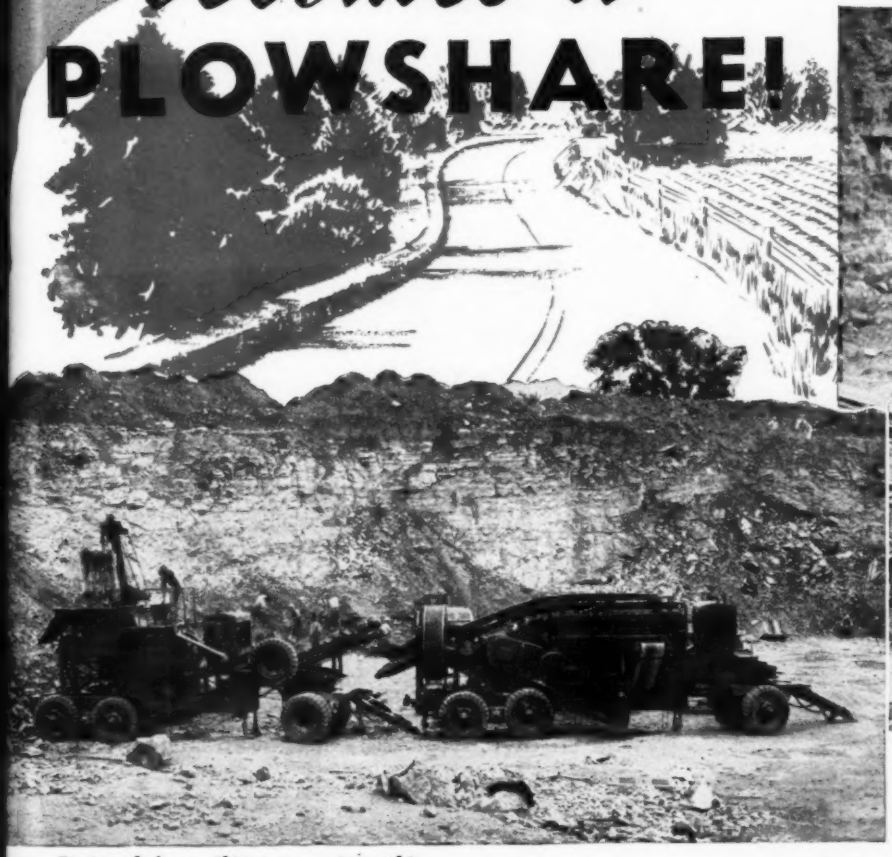
Fleet owners should be particularly interested in our new policy of concentration on their needs. This is of great importance because it will enable us to engineer and build vehicles to their exact needs. Fleet owners will recognize that this policy will result in a truck which will out-perform and outlive standard production models in a great majority of cases. Chances are, however, people will assume such trucks will cost too much. If you people in the agency can persuade fleet owners to get the facts from our engineering staff, that is all we ask of you. We can demonstrate clearly the fundamental economy of the new Ward LaFrance policy to any fleet owner's satisfaction.

A. Ward LaFrance.

GREAT AMERICAN INDUSTRIES, INC., GENERAL OFFICES, MERIDEN, CONNECTICUT
DIVISIONS
CONNECTICUT TELEPHONE & ELECTRIC DIVISION, MERIDEN, CONNECTICUT
WARD LaFRANCE TRUCK DIVISION, ELMIRA, N. Y.—FACTORY BRANCH, 139TH ST. & EASTERN BLVD., NEW YORK
VIRGINIA RUBATEX DIVISION, BEDFORD, VIRGINIA
RUTLAND ELECTRIC PRODUCTS DIVISION, RUTLAND, VERMONT

AMERICA IS *Smile with aggregate!*

# *Another* SWORD *becomes a* PLOWSHARE!



*Designed for military service, this type of Cedarapids crushing and screening plant will easily handle your toughest aggregate producing problems.*

*This Cedarapids mobile plant was on duty in a French quarry five days after D-day.* Signal Corps Photo

Cedarapids

Built by IOWA

## THE IOWA LINE

*of Material Handling Equipment Includes*

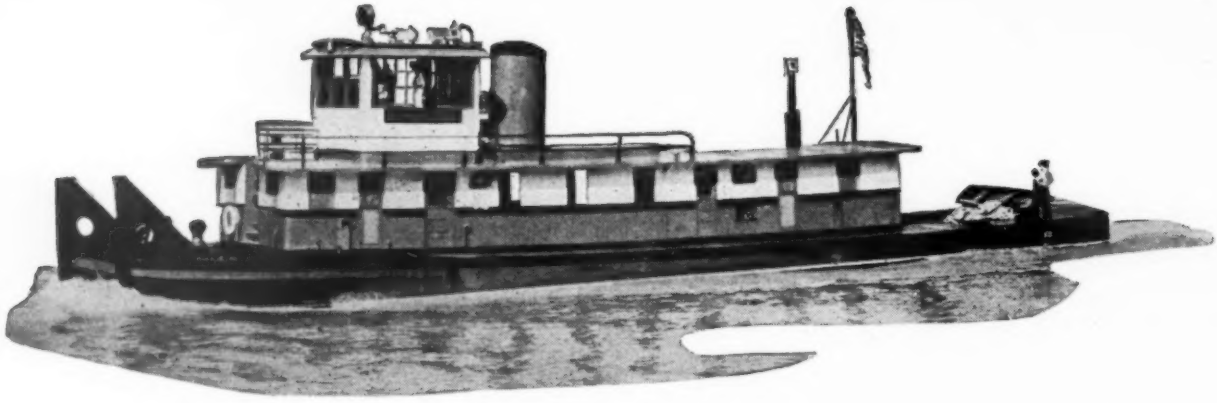
ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS — TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

From building military airports and highways that are vital to victory to producing aggregates for peacetime airports, highways, dams, and other construction projects, is the next step for these Cedarapids portable crushing plants.

We're still building them for the Army and Navy but soon all the experience and facilities which produced these plants on schedule can be turned almost entirely to building them for you. They will turn out better products for less money, keeping you in that wonderful competitive position that you have always had with Cedarapids equipment.

Whether you are figuring on a single unit or a complete plant, you'll be way ahead if you get it from Iowa, headquarters for aggregate producing and crushing equipment, and asphalt plants. See your local Iowa dealer today.

**IOWA MANUFACTURING COMPANY**
**CEDAR RAPIDS, IOWA**



# THE ONLY CLUTCH

## THAT WILL TAKE THIS DARE!


**12 IMPORTANT ADVANTAGES OF FAWICK AIRFLEX CLUTCHES**

1. Simple in design and operation
2. Flexible control by air
3. No adjustments or oiling—low maintenance
4. Dampens vibration—absorbs shocks
5. Corrects misalignment automatically
6. Smooth starting—no jerks
7. Runs cooler—uniform pressure
8. Controls torque by air pressure
9. Greater capacity—more compact
10. Remote control by air valve
11. Replaces flexible couplings
12. Acts as clutch, slip-clutch, break and coupling.

Here's a clutch job that only the Fawick Airflex clutch can do.

This tug, driven by a powerful Diesel engine, was thrown from full speed ahead to full reverse in 3 seconds, without damage to clutch, engine or propulsion equipment. That's about equal to slamming your car into reverse while you are going 40 miles an hour.

In thousands of naval vessels, the Fawick Airflex clutch is delivering maneuverability, stamina and ease of operation to a degree never before known.

Your peacetime needs may demand just that kind of service. Our Engineering Department will be glad to make recommendations based on broad experience.

**FAWICK AIRFLEX COMPANY, INC.**
**9919 Clinton Rd. • Cleveland 11, Ohio**
*In Canada,* **Renold-Coventry Ltd., Montreal, Toronto, Vancouver**
*In Britain,* **Crofts Engineers, Ltd., Bradford, England**

# FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

*A new kind of performance*

*for* **TRUCKS..**

**TRACTORS..**

**BUSSES..**

*wherever the going is*

***REALLY TOUGH***

# Gulf Dieselube H.D.

Among operators of heavy-duty gasoline and Diesel engines, today's big problem is *how to keep 'em in service* and any product that can help is a welcome one!

We believe Gulf Dieselube is the answer. *Here is why:* ★Gulf Dieselube possesses remarkable lubricating qualities. ★Its detergent action aids in keeping motors clean and rings free. ★It holds carbon and sludge forming materials in suspension, thus preventing harmful deposits in the crankcase and on rings and pistons. ★It is entirely non-corrosive to all types of alloy bearings, including copper lead and cadmium silver. ★It has an unusually high resistance to oxidation. ★It minimizes wear . . . helps eliminate costly repairs and time out for overhaul. ★It is a most modern type of motor oil for severe service and currently is being used with outstanding success under a wide variety of service conditions.

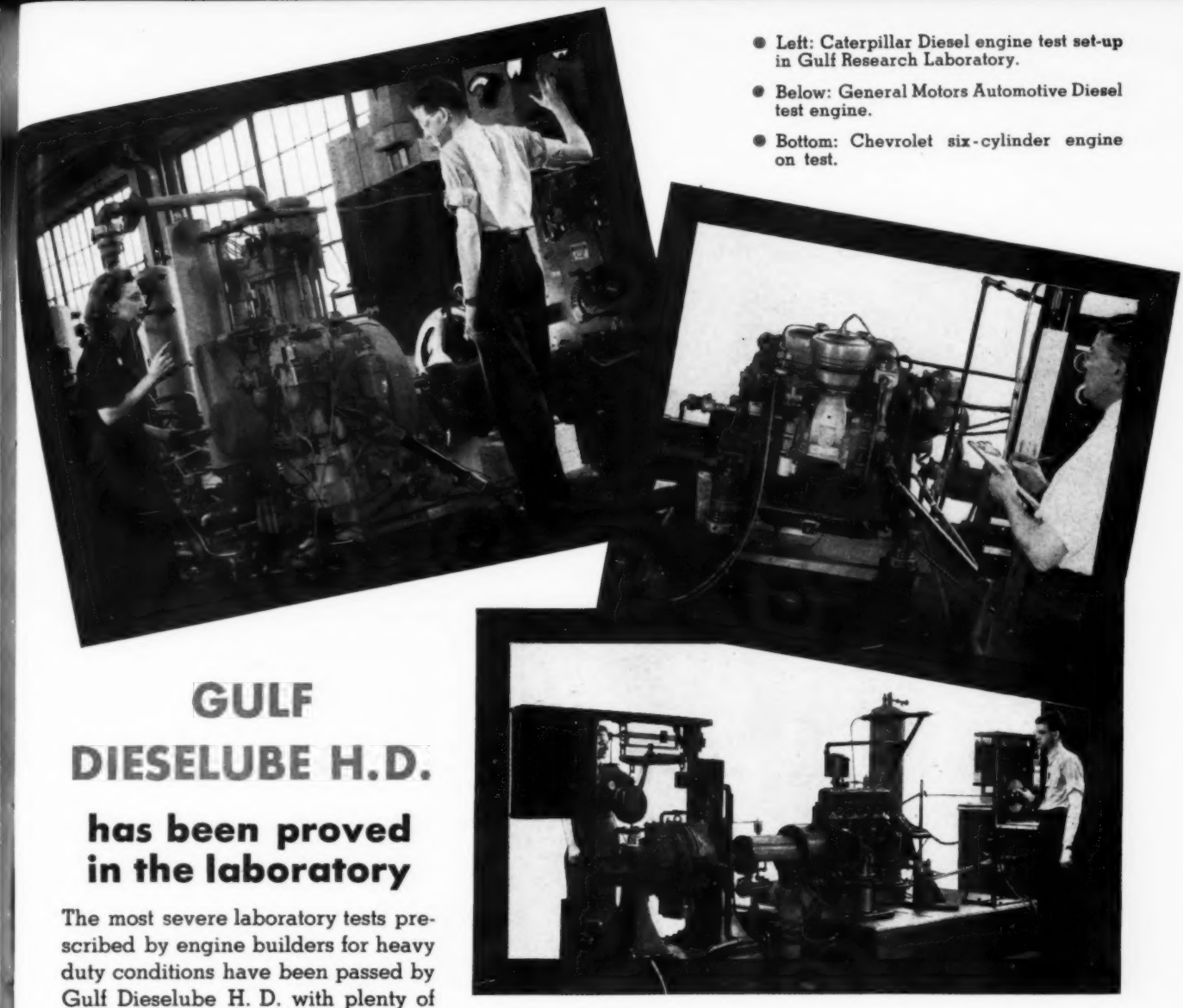
*Gulf Dieselube H.D. will help you save money.*

# Gulf Dieselube H.D.

## *meets* GOVERNMENT SPECIFICATIONS

THE U. S. Army's Specification 2-104B for Engine Oils calls for heavy duty, high quality lubricants which are required by exacting laboratory tests to furnish superior results under heavy duty conditions. Gulf Dieselube H. D. meets this specification for lubricating oil which is mandatory for use by our country's Armed Forces—for tanks, jeeps, trucks and, in fact, for all ground equipment.

Engine manufacturers approve and recommend Gulf Dieselube H. D. for use in equipment which is operated under extreme service conditions and an ever increasing number of Operating Superintendents and others responsible for motor maintenance are specifying Gulf Dieselube H. D. for trucks, busses, tractors, contractors' equipment, road building machinery, and other gasoline and Diesel fueled equipment under their supervision.



- Left: Caterpillar Diesel engine test set-up in Gulf Research Laboratory.
- Below: General Motors Automotive Diesel test engine.
- Bottom: Chevrolet six-cylinder engine on test.

# GULF DIESELUBE H.D.

## has been proved in the laboratory

The most severe laboratory tests prescribed by engine builders for heavy duty conditions have been passed by Gulf Dieselube H. D. with plenty of quality to spare. Examination of engine parts, after comparative tests, has shown engines lubricated with this product to be in remarkably clean condition.

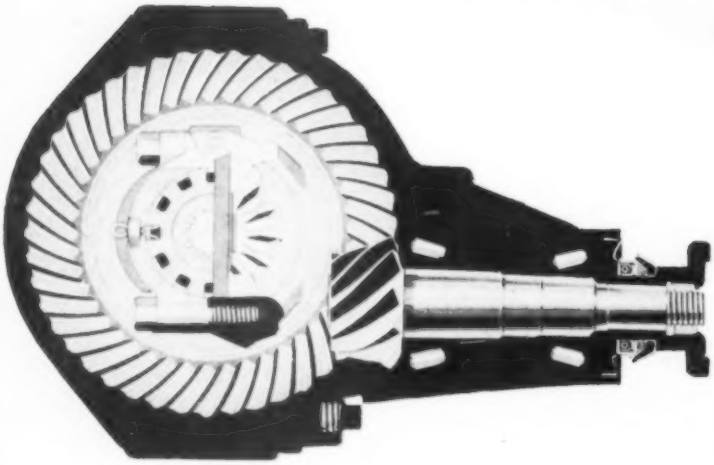
### *SEE HOW GULF DIESELUBE STACKS UP ON THESE 7 BIG POINTS*

1. Meets U. S. Army Specification 2-104B for Oil; Engine, for use in all ground vehicles operated by the U. S. Army.
2. Approved by manufacturers of Diesel engines for trucks, busses, tractors, marine and stationary installations.
3. Remarkable results secured in preventing ring sticking and clogging of oil lines and in keeping engines clean.
4. Non-Corrosive to alloy bearings—a big factor in today's operation.
5. Minimizes cylinder and ring wear.
6. Non-foaming under any condition of service.
7. Recommended for trucks, busses, tractors, marine engines, industrial Diesel, and heavy-duty gasoline engines.

**with GULF Dieselube H.D.**

**you drain out the dirt before the damage is done**

# *New Improved* GULF AUTOMOTIVE GEAR LUBRICANTS ELIMINATE FOAMING



The use of ordinary gear lubricants in units which are overloaded, operated at high speeds, and where parts have become worn frequently results in the formation of foam in transmissions, differentials, and final drives. This condition often presents a serious problem in the loss of lubricant and the resulting lack of adequate lubrication.

The new Gulf Transgear Lubricant E. P. eliminates foaming under all conditions.

This high quality product now contains a new Anti-Foam Agent developed by Gulf lubrication engineers and laboratory technicians and is compounded to provide extreme pressure characteristics of the mild type to protect gears where tooth pressures are high.

Two other Gulf Gear Lubricants—Gulf Hypoid Gear Lubricant 90, A.P.T. (All Purpose Type), and Gulf Transmission Oils (high quality straight mineral gear oils), also contain Gulf's new Anti-Foam Agent and will give entire freedom from gear oil foaming under any service conditions.

A telephone call or a penny post card addressed to the nearest Gulf office listed below will bring a Gulf representative who will demonstrate the non-foaming characteristic of these products and also answer any questions you may wish to ask regarding them.

## *plus* a Specialized Line of Gulflex Automotive Lubricants for Specific Chassis Requirements

**1 GULFLEX CHASSIS LUBRICANTS** are long lasting products, specially manufactured for heavy duty chassis lubrication. Available in two grades to provide proper consistencies for Summer and Winter service, it protects spring shackles and general chassis points from wear under heavy bearing loads. Gulflex Chassis Lubricant S meets U.S. Army Specification 2-107 for Grease, General Purpose, No. 1.

**2 GULFLEX WHEEL BEARING GREASE** was developed in Gulf's Laboratories after exhaustive tests and study of Wheel Bearing Grease requirements under severe heavy service conditions. Specially compounded for exceptionally long service life, this grease will provide safe lubrication for many miles more than might be expected from Wheel Bearing Greases of ordinary quality. Gulflex Wheel Bearing Grease is easy to apply, yet it has a sufficiently high melting point to be retained in the bearing under severe service. Meets U.S. Army Specification 2-108, Grease, General Purpose No. 2 for wheel bearings.

**3 GULFLEX WATERPROOF GREASE** is specially designed for the lubrication of automotive cooling system pumps where a firm water resistant type grease is required. Highly insoluble in hot water or anti-freeze compounds—is also an excellent grease for sealing packing glands as well as for lubricating pump bearings. Meets U. S. Army Specification 2-109 Grease, Water Pump.

**4 GULFLEX UNIVERSAL JOINT LUBRICANT** is a fibrous type grease, prepared to the exacting specifications of manufacturers of grease type universal joints. It properly lubricates grease type universal joints at high speeds and successfully withstands the temperatures developed by overloading and high angle operation.

**5 GULFLEX GRAPHITE SPRING LUBRICANT** is recommended specially for lubrication of metal covered springs where a high quality Graphite Grease is required. It also is recommended for fifth wheel lubrication of tractor equipment.

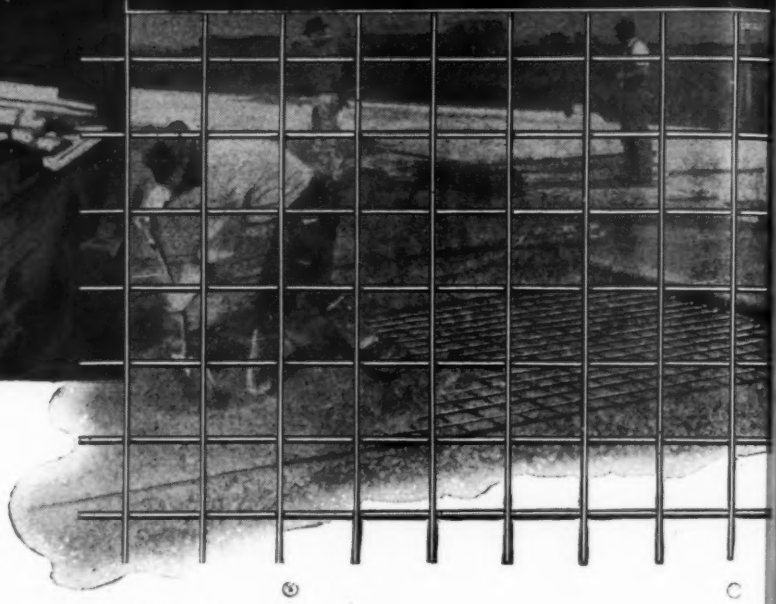
GULF

**GULF OIL CORPORATION · GULF REFINING COMPANY**

BOSTON NEW YORK PHILADELPHIA PITTSBURGH ATLANTA
NEW ORLEANS HOUSTON LOUISVILLE TOLEDO

Concrete Highways, too, need reinforcing such as

# TRUSCON WELDED STEEL FABRIC PROVIDES!



# *Steel for Roads that Endure!*

With relation to the above bomb-shattered structure in Italy, the Saturday Evening Post says in a January 29, 1944 article: "Palermo had few steel-reinforced buildings. Most were of plain masonry, highly vulnerable to aerial bombing."

The same principles of destruction apply to the design of our American concrete highways. *Where there is no steel reinforcement there is high vulnerability to the shattering effects of heavy traffic and natural forces!*

For many years, concrete reinforced with Truscon Welded Steel Fabric has been an accepted and proved formula for road permanence. Engineers and designers know by research, practice and experience, that the following advantages can be secured from Truscon Welded Steel Fabric Reinforcement:

1. Provides resistance to cracking due to shrinkage of concrete during setting period.
2. Provides tensile strength necessary to resist subgrade friction caused by expansion and contraction of the concrete slab due to temperature changes.
3. Provides increased resistance to cracking of concrete due to warping under load.
4. Provides resistance to the development of microscopic cracks into visible cracks.
5. Provides resistance to cracks opening and allowing the entrance of water.
6. Provides resistance to broken ends of slabs separating at a crack.
7. Decreases spalling and progressive disintegration of the concrete.

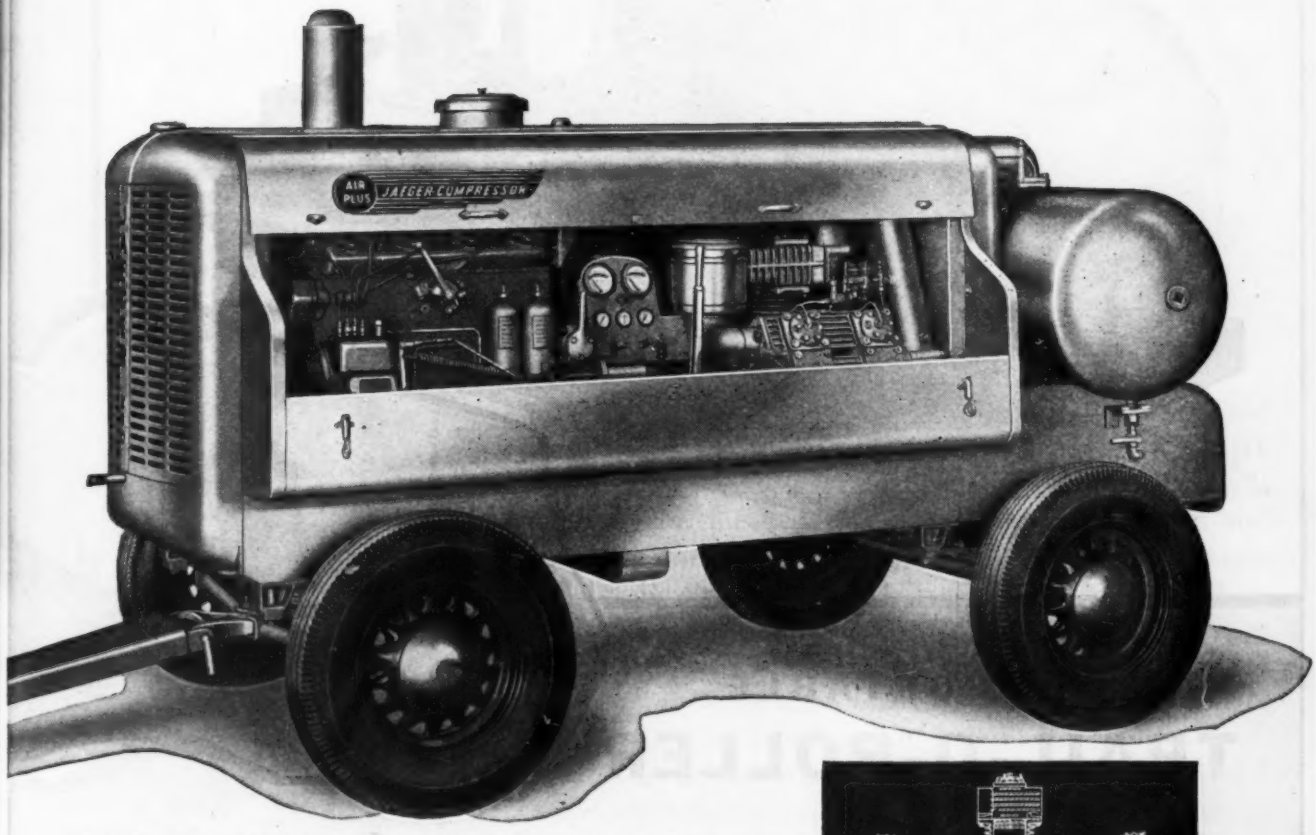
When you plan roads, plan them well. Use structural designs that have been proved the most economical, durable and serviceable in the *long run*. Use Truscon Welded Steel Fabric with other associated Truscon roadbuilding products, and assure lasting prestige for you and more permanent highways for the communities you serve.

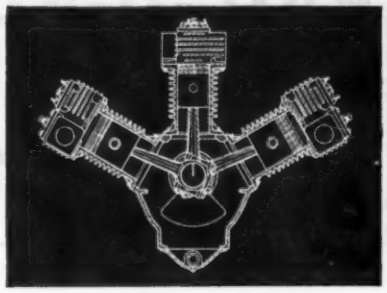
**TRUSCON**
*Steel Company*

YOUNGSTOWN 1, OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION

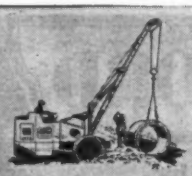
# AIR PLUS JAEGER COMPRESSOR



**BUILT IN A BALANCED "W" TO GIVE YOU S-M-O-O-T-H-E-R PERFORMANCE — COMPLETE ACCESSIBILITY OF EVERY PART**

**By fundamentally correct design, as well as micro-precision workmanship (parts honed and lapped to aircraft engine tolerances), Jaeger provides the efficiency, stamina and ease of maintenance you have always wanted in air compressors. Identified by the name "AIR PLUS". All sizes, from 60 to 500 feet. . . THE JAEGER MACHINE COMPANY, COLUMBUS 16, OHIO.**



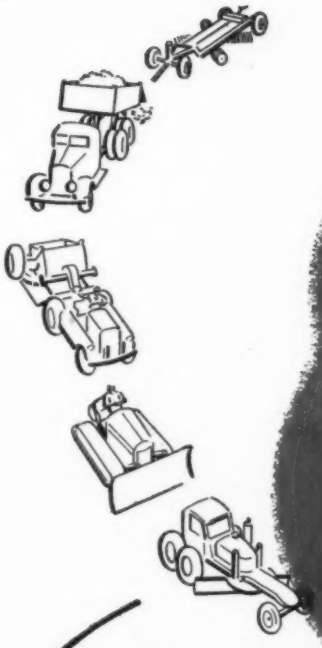
"FLEET-FOOT" Crane-Loaders

"SPEEDLINE" Concrete Mixers

"SURE PRIME" Contractors Pumps

**JAEGER** *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

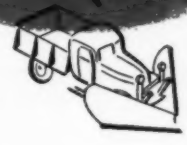


# BLACKHAWK HYDRAULIC EQUIPMENT Serves You On TWO FRONTS

**Hydraulic Controls for Your Road Machinery —**

**BUY FROM YOUR EQUIPMENT MANUFACTURER**

Hand-operated or power-driven pumps, along with valves and rams, are available for installation on your present equipment. Blackhawk is already cooperating with road machinery manufacturers who want their postwar equipment to have the benefit of advanced developments in hydraulics. Specify "Blackhawk" Hydraulic Controls.



You have your own two-front war—and it's our job to help you win. ON THE ROAD — Blackhawk Hydraulic Controls actuate the business-end of snow plows, graders and other important machinery. IN THE SHOP — Blackhawk Hydraulic Products (and Wrenches) serve to speed up repairing, rebuilding and reconditioning of vehicles and machines. When buying Hydraulic Equipment for *either front* — the ROAD or the SHOP — always specify BLACKHAWK. You'll get dependable Hydraulics, engineered to top efficiency—the result of "service-proved" experience unmatched by any other builder of Hydraulics.

**HYDRAULIC EQUIPMENT FOR YOUR SHOP—**
*Buy from Your Automotive or Industrial Equipment Distributor*

**HAND JACKS**

— for your vehicles, shop jobs, shoring and other construction operations. Wartime line includes 3, 5, 8, 12, 20 and 50-ton models. Can be gauge-equipped for testing load-bearing qualities of soil and concrete pipe.

**PORTO-POWER**

is becoming a recognized "must" among road construction men. Hydraulic units and attachments are made today in 7, 10, 20 and 50-ton capacities. Pushes, pulls, lifts, clamps, spreads and presses—in any direction, over any span—on the road job or in the shop.

**SERVICE JACKS**

Indispensable around the shop for repair work and fast, precision parking of heavy road machinery. Famous S-4 (4-ton model) is made during the war.

**BLACKHAWK** *High-Pressure Hydraulics*

BLACKHAWK MFG. CO.
Dept. RS Milwaukee 1, Wisconsin.

☐ Send Literature on Hydraulic Controls.

☐ Send Literature on Hydraulic Jacks, Porto-Power and Wrenches.

Name_____

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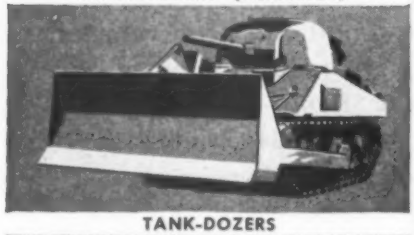
"BULLDOZERS COME FIRST"—Just released by McGraw-Hill, this new 278-page book dramatically illustrates the prime importance of bulldozers and other construction equipment in winning the war against the Axis. Written by five of the country's ablest war correspondent editors, it's packed with facts and pictures gleaned from all the major battle areas.

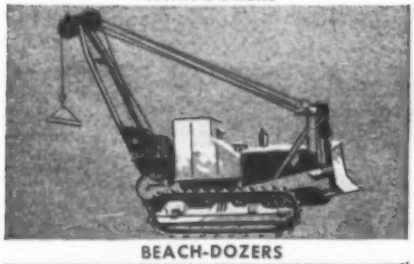


BULLDOZERS

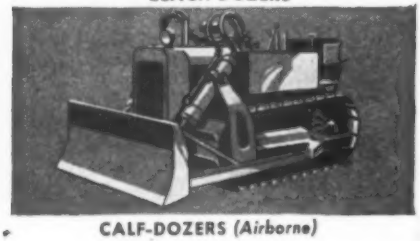
PIVOT-DOZERS* *(Trailbuilders)*



TANK-DOZERS



BEACH-DOZERS



CALF-DOZERS *(Airborne)*

# ....And LA PLANT-CHOATE *Comes first* IN BULLDOZERS!

## *Again in '44—LaPlant-Choate Built More Dozers for Essential Needs Than Any Other Company*

While detailed figures cannot be revealed because of military censorship, 1944 was *the biggest production year in dozer history.* Moreover, again this year LaPlant-Choate built more dozers for the armed forces and essential civilian users than any other company in the industry. In addition to thousands of cable and hydraulic operated bulldozers and Pivot-dozers*, LaPlant-Choate developed and built hundreds of highly specialized engineer units—including the now famous Tank-dozer, the Beach-dozer and the small airborne Calf-dozer. This record-breaking production, plus LaPlant-Choate's *21 years of "know-how" in dozer engineering is your* best assurance of tomorrow's best buys in dozer equipment. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

*Trade-mark applied for

Note the three stars—LaPlant-Choate is one of the few companies in the construction equipment industry to have won the Army-Navy "E" award of merit—four times in a row.

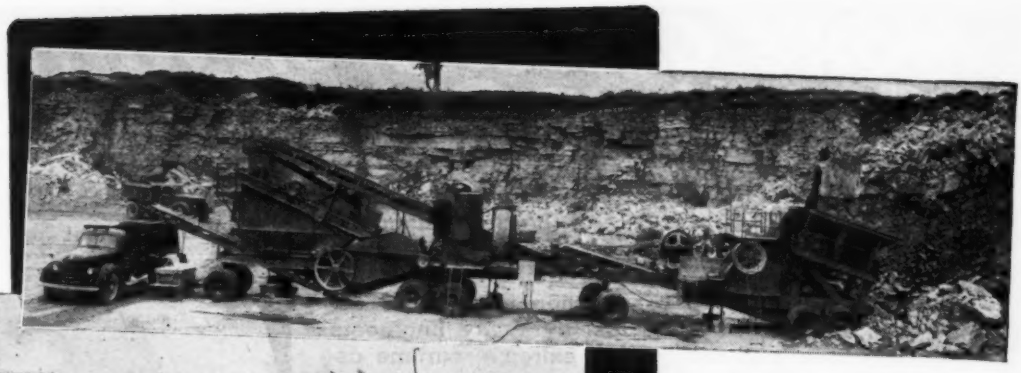
ARMY E NAVY

**LA PLANT-CHOATE**

*America's Oldest and Largest Manufacturer of Dozers*

*J. A. Gallagher, Madison, Wisc., contractor uses a Universal 546-P primary unit with 20" x 36" jaw crusher in Viroqua, Wisc. quarry. Plant is electric-powered.*

*Below: Beu & Sons use a 546-P primary unit with 20" x 36" crusher for primary reduction of limestone at Ackley, Iowa. Secondary plant has No. 4 Universal Pulverizer.*



*The 30" x 42" Welded Steel Plate Roller Bearing Crusher on this 546-P Primary Unit increases output for Art Overgaard's No. 1 plant at Cashton, Wisc. This is the third 546-P unit purchased by this operator.*

# Quarries step-up output with this UNIVERSAL Primary Unit!

These Universal Portable Primary Crushing Units greatly increase output for quarries because larger chunks of shot rock need not be rejected or sledged. In addition, they increase the output of secondary crushers by delivering material of a more uniform size to them.

Made in four sizes: 16" x 24", 20" x 36", 24" x 36" or 30" x 42" jaw crushers. Apron feeder empties onto bar grizzly with by-pass chute for material suitable for secondary unit. Apron feeder can be readily detached and slid off onto a truck to facilitate hauling. Ideal for use with Universal 822-Q, 410-Q, 880 and other plants as well as *other makes* of quarry plants that need to be geared to tomorrow's requirements. Send for details.


**UNIVERSAL ENGINEERING CORPORATION**
631 C Ave. West, Cedar Rapids, Iowa

ARMY E NAVY

**UNIVERSAL**

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Start Post-War Planning Now!

# *Bulletin*

## TO ALL TRUCK OPERATORS AND FLEET OWNERS

# D Trucks Available for Civilian urchase on and after Jan. 1, 1945

OOD NEWS—FWD four-wheel-drive trucks, re-eminent in war services, with production previously restricted almost exclusively for the military, are soon to be available for motor transport, highway, utility, oil fields, and other essential civilian services.

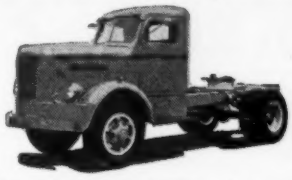
Recent directive from the WPB provides for production of a substantial number of FWD trucks in a wide variety of models and types, 2½ to 15 tons capacity; such trucks to be built only for essential civilian uses. FWD trucks built under this release will be available for purchase on and after January 1, 1945. Deliveries will be made in keeping with priority of orders as received; immediate action and prompt placing of orders is urgent to assure delivery before limit of production is reached.

Write — wire — or phone us directly, or the nearest authorized FWD dealer for full information and your eligibility to purchase under these new rationing regulations.

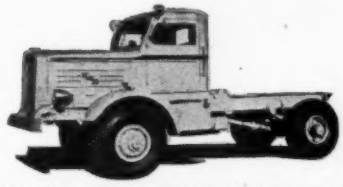
FWD TRUCKS

**THE FOUR WHEEL DRIVE AUTO CO.**
Clintonville, Wisconsin
*Canadian Factory: KITCHENER, ONTARIO*

## These and other FWD Trucks, 2½ to 15 ton capacity, available to qualified purchasers.

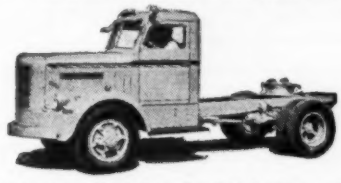


Straight trucks in FWD's "H" series range 17,000 to 20,000 lbs. gross vehicle weight capacity with wheelbases from 144" to 154" gasoline engine powered with power plants from 100 to 120 hp and with four-wheel drive.



"M" series FWD's powered with either gasoline or diesel engines ranging from 150 to 200 hp and with capacities ranging from 30,000 to 42,000 lbs. gross vehicle weight. Four wheel drive.

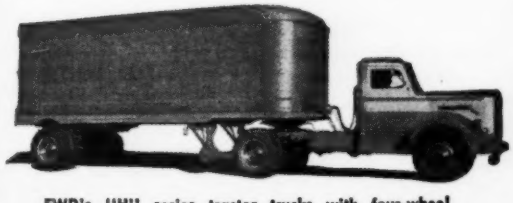
"U" series FWD's with gross vehicle weight capacities of 22,000 to 28,000 lbs. Powered with 125 hp gasoline engines, 5 speed transmission, 11:00x20 tires, wheelbase 150". Four wheel drive.



FWD's four-wheel drive Road Maintainer — built for underbody scraper use with extra heavy frame and other features that make it the ideal unit for street and road maintenance. Engine 115 hp — 5 speed transmission — 8:25x20 dual tires.

Utility Line Construction and Maintenance trucks by FWD with 5 and 7 man cabs, special power-take-offs and line bodies. Powered with 115 hp engine on 144" wheelbase with four-wheel drive, 5 speed transmission, 144" wheelbase and 9:00x20 tires.

Six-wheel drive FWD trucks with gross vehicle weight capacities of 55,000 lbs. Powered with either gasoline or diesel engines of 150 and 200 hp. Wheelbase from 214½" to 276".



FWD's "H" series tractor trucks with four-wheel drive and gross vehicle weight ratings from 40,000 lbs. to 60,000 lbs. Powered with gasoline engines ranging from 100 to 120 hp on wheelbases from 120" to 144" in conventional or cab-over-engine types.


1 PORUS-KROME applied to the cylinder walls of gasoline and Diesel engines multiplies the life of the cylinders from 4 to 20 times.

2 PORUS-KROME on the cylinder walls multiplies the life of the ordinary piston rings from 3 to 5 times.

3 PORUS-KROME, with its thousands of tiny pores and channels which hold lubricating oil and feed it back as needed, improves lubrication and holds lubricating oil consumption at a constant low level.

4 PORUS-KROME and piston rings wear so slowly that high power development is maintained for many more hours . . . many more miles . . . than with ordinary cylinders.

5 PORUS-KROME means greater engine reliability because it reduces scoring and scuffing and the risk of piston seizure and because it cuts down the number of overhauls caused by cylinder and ring wear.

***All of these advantages add up to a substantial saving in engine operating costs.***

VAN DER HORST

U. S. PATENTS 2,048,678 AND 2,314,604

# PORUS - KROME

*Good for the Life of your Engines*

* PORUS-KROME is pure, hard chromium which is applied to cylinder bores by the patented Van der Horst process. It has tiny pores and channels in its surface which serve as reservoirs for lubricating oil, feeding it back as needed. It reduces corrosion and wear and multiplies cylinder life 4 to 20 times.

**VAN DER HORST CORPORATION OF AMERICA** OLEAN • NEW YORK CLEVELAND 11 • OHIO

AN AFFILIATE OF DRESSER INDUSTRIES

# FROM WAR-TIME EXPERIENCE . . .

## TO PEACE-TIME SERVICE . . . and BETTER VEHICLES

For ten years before the Japanese attacked Pearl Harbor, Marmon-Herrington was designing and building special vehicles required for the world's most difficult civilian and military services. These vehicles, utilizing the *All-Wheel-Drive* principle, were prime favorites of users in the oil, logging, public utility, road building and road maintenance services of our own and many foreign countries. Their ability was unexcelled.

Now, with almost four years of experience in building vehicles exclusively for the rigorous services of armed forces, we will have *still greater performance and reliability* to offer our industrial customers, when Peace comes. If your job calls for more than usual ability in trucks, remember the name MARMON-HERRINGTON. Plan *now* to add Marmon-Herrington units to your fleet, as they become available. Write for literature.

★ BUY MORE IN '44 . . . WAR SAVINGS BONDS ★

# MARMON-HERRINGTON

# *All-Wheel-Drive* TRUCKS

MARMON-HERRINGTON CO., Inc., INDIANAPOLIS 7, INDIANA

Cable Address: MARTON

# Heavy hauls really ROLL on this TIME-PROVED TOUGHER TREAD


GOODYEAR ALL-WEATHER EARTH-MOVERS keep this LaPlante-Choate CARRIMOR working fully up to its name.

MORE AND MORE contractors now buy Goodyear All-Weather Earth-Movers for drawn units because they know that this great work tire gives them maximum flotation — keeps their *heaviest* loads moving free and fast.

That's because the rugged, job-proved All-Weather tread of this BIGGER tire extends over the shoulders *to the center of the sidewalls* —provides side traction, prevents side slip on grades.

Its wider tread channels and rounded, sturdy diamonds assure complete self-cleaning and protection against snagging. And its tougher bead construction provides security against rocking, chafing and rim cutting.

Now super-armored with Goodyear's patented Rayotwist cord—*the strongest body we've ever used in a work tire*—these Goodyear off-the-road giants are by far the finest that can be built from synthetic and permissible natural rubber available today. They deliver more ton-miles of heavy-duty service because they are the longest-lasting, hardest-working tires available.

For proof of that, talk to the men now using them. Once you do, you will want Goodyears on all your units.

**THE RIGHT TIRE FOR EVERY JOB**
*Rayotwist-armored for extra strength*


ALL-WEATHER EARTH-MOVER for drawn vehicles
HARD ROCK LUG for all rock work
SURE-GRIP for drive wheels

PRODUCTS OF GOODYEAR RESEARCH

**BUY WAR BONDS—BUY FOR KEEPS**

All-Weather, Rayotwist, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

ROADS AND STREETS

December, 1944, Vol. 87, No. 12

# Hot-Mix Placed Shoulder Width on Fills

## Novel labor-saving equipment devised by Brown Brothers of Albuquerque in placing bituminous erosion curbs on 8.7-mile U. S. 85 job in New Mexico

THE largest road building job in New Mexico, on U. S. 85 between Santa Fe and Las Vegas, is a good example of latest standard bituminous practice, and also the scene of an important innovation or two. The innovation consists of widening out the asphalt base and surface an extra 8 ft. on either side across valley fills, or practically to the shoulder lines, as erosion protection, and use of mechanically formed hot-mix curbs to prevent surface-washing of embankment slopes.

The soil of the locality is an A-4 or A-7 material which washes so easily that without some kind of protection constant maintenance of shoulders and slopes was seen to be necessary. In addition to the usual concrete check dams in side ditches, and concrete gutters and rundowns along fill edges, it was decided to pave shoulders on fills where the grades were such that bad washing might occur. This was done by widening the road mix base stabilization from standard 26 ft to 42 ft., or to shoulder lines.

A total of 2,528 lin. ft. of hot-mix curb was placed in the wake of the widened road-mix surfacing operation. The curb consists of a prism 6 in. high by 18 in. wide at the base. The scheme was to leave about a 15-ft. break in the curb at the middle of the fill, through which surface run-off is carried down a paved concrete apron to drainage inlets and outlets.

Such a curb of a road-mix type had been tried out on two projects in 1943, but this was the first instance in New Mexico of a hot-mix curb placed by a contractor.

### Special Curb Forming Machine

The bituminous mix used in the curb consisted of 200-300 pen. asphalt and graded ½-in. max. crushed gravel aggregate, the oil content being 5 per cent. The mix was delivered at about 325° F.

To form the curb rapidly and accurately Brown Bros.' superintendent, LeRoy Evans, hit on the idea of a spreader box with a bottom pan so shaped as to leave a prism of loose mix material as it is towed along. The accompanying photographs show the spreader box, as finally sketched up and welded into shape by the contractor's shop welder. The hopper holds 30 cu. ft. of material. Mix is fed by gravity through a bottom slot at the front end. The prism-shaped bottom form is ½-in. oversize, to allow for compaction to plan dimensions.

Attached to the rear of the hopper is an additional form plate, dimensioned ⅛ in. undersize. The really novel feature is that this plate vibrates the loose mix under pressure.

Middle distance: Note how 24-ft. roadway is widened to 40 ft. across valley fill. At right: Road-mix stabilized base using old materials. Left: One lane of hot-mix topping

Spreader box in action. The pressure form behind the box is vibrated by a nose clamped over the plate, and pressure applied by means of handle as shown

Inspecting the new U. S. 85 work near Santa Fe: D. M. Emrich of PRA; D. R. Abelard, dir. N. M. Planning survey; W. G. Brown, proj. engr.; H. M. Sleeper, highway dept.; Leroy Evans, supt. for Brown Bros., contractors

separate contract by D. D. Skousen of Albuquerque, N. Mex., represents latest New Mexico practice in adapting roadbed design to site materials. A complete soil profile was prepared, from which a combined thickness of ballast, base course and bituminous topping was selected to furnish the design load-carrying capacity.

Specifications called for a ballast course consisting of materials with a plasticity index not exceeding 6 per cent. As a consequence, the material was one that corrugated easily under traffic, resulting in a loosely mulched road under late summer maintenance before a bituminous topping could be put down. Ordinarily the procedure as begun in 1943 would have been to water the road and roll to set it up for paving, but because of the lateness of the season it was thought that this might lock excessive moisture into the subgrade and intensify frost action.

Instead the mulch or loose base course material was stabilized to 1 in. or deeper by standard road mix methods.

## Hot-Mixed Placed from Modern Plant

The 8.7 mile job required 1117 tons of base course per mile stabilization materials involving 3336 bbl. or RC-2 cutback asphalt. For processing the hot-mix, Brown Bros. set up a modern 100-ton-per-hour plant near the job which consisted of a 4000 lb. batch pug mill, powered by a 105.8 hp. caterpillar semi-portable diesel plant, rotary dryer, 3 buried 6,000-gal. asphalt tanks, 85 hp. boiler, large water tank and 10,000 lb. boiler fuel tank.

(Below): Shows section of neatly formed curb and example of shoulder erosion which the curb is intended to control. Note winch truck in background, used to tow the tractor and box during forming operations. (Lower): How box is hitched to tractor

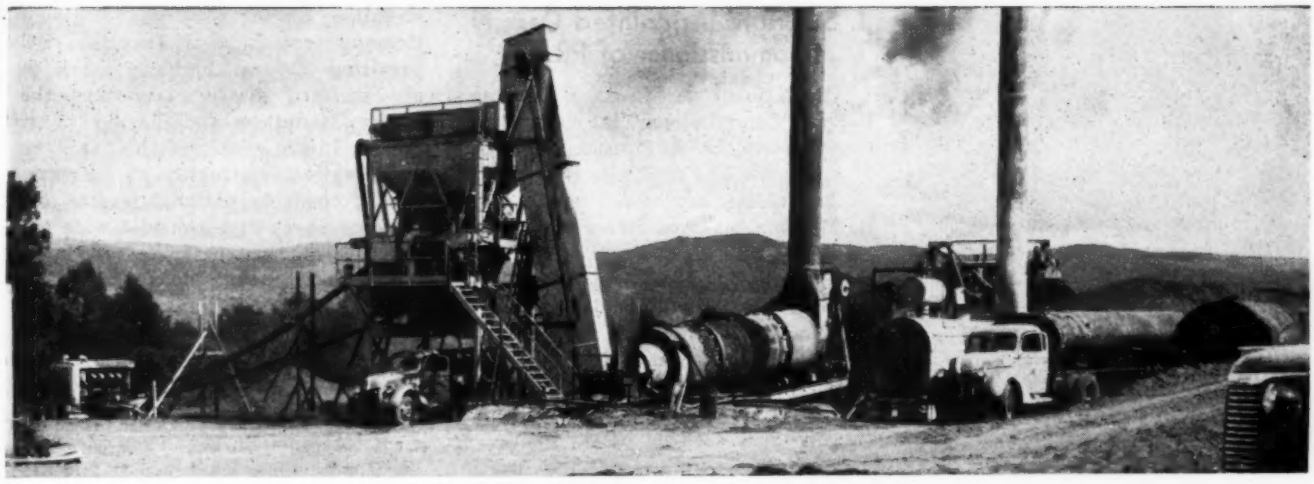
Pressure is controlled by a hand lever, which also lifts the plate clear. Vibration is furnished by a bullnose clamped on top of the plate and powered by a standard vibrator unit mounted on the edge of the box "like an outboard motor."

The spreader was towed along on steel skids at the rate of 15 ft. per minute. It was kept attached to a rubber tired tractor, which skidded it along the road shoulder when traveling between curb sections. The tractor remained hitched at all times, but during curb forming operations towing power was furnished by a winch line from a truck stationed ahead, to insure an even, measured pace.

This outfit, in addition to leaving a perfectly formed and aligned curb, also was quite a labor saver. The crew consisted of a man on the winch truck, two shovelers working mix forward into the feeding slot, a man riding the pressure lever and a finisher to touch up irregularities with a hand trowel.

## Hot-Mix on Road-Mix Base

The new road grade, completed during the previous winter under a



Brown Brothers' modern 100-ton-per-hour hot-mix plant

## Bid items, 8.7-mile hot-mix surface, road mix base project, U. S. 85, New Mexico, let August, 1944. Project SN-F.A. 90-C(2)

| ITEMS | Quantities | Unit | Brown Brothers Albuquerque, N. Mex. Unit Bid | Brown Brothers Albuquerque, N. Mex. Amount | Henry Thygesen & Co. Albuquerque, N. Mex. Unit Bid | Henry Thygesen & Co. Albuquerque, N. Mex. Amount | G. I. Martin Albuquerque, N. Mex. Unit Bid | G. I. Martin Albuquerque, N. Mex. Amount | Skousen Const. Co. Albuquerque, N. Mex. Unit Bid | Skousen Const. Co. Albuquerque, N. Mex. Amount |
|---|---|---|---|---|---|---|---|---|---|---|
| *Schedule No. 1* | | | | | | | | | | |
| Excavation—Unclassified | 2,000 | Cu. Yd. | $ .40 | $ 800.00 | $ .60 | $1,200.00 | $ .75 | $1,500.00 | $ .50 | $1,000.00 |
| Excavation for Pipe Culverts | 70 | Cu. Yd. | 2.00 | 140.00 | 1.00 | 70.00 | 1.50 | 105.00 | 2.00 | 140.00 |
| Rolling—Sheepsfoot Roller | 25 | Hour | 6.00 | 150.00 | 5.00 | 125.00 | 4.00 | 100.00 | 4.00 | 100.00 |
| Watering | 32 | M. Gal. | 4.00 | 128.00 | 2.50 | 80.00 | 2.00 | 64.00 | 3.00 | 96.00 |
| Class "A" Concrete | 13 | Cu. Yd. | 40.00 | 520.00 | 25.00 | 325.00 | 30.00 | 390.00 | 30.00 | 390.00 |
| Class "A" Concrete—Check Dams | 16 | Cu. Yd. | 40.00 | 640.00 | 25.00 | 400.00 | 30.00 | 480.00 | 30.00 | 480.00 |
| Class "A" Concrete—Cutoff Walls | 34 | Cu. Yd. | 40.00 | 1,360.00 | 25.00 | 850.00 | 25.00 | 850.00 | 30.00 | 1,020.00 |
| Class "A" Concrete—Rundowns (4" thick) | 818 | Sq. Yd. | 5.00 | 4,090.00 | 3.50 | 2,863.00 | 3.50 | 2,863.00 | 3.00 | 2,454.00 |
| Reinforcing Steel | 570 | Pound | .20 | 114.00 | .15 | 85.50 | .15 | 85.50 | .20 | 114.00 |
| Std. Reinf. Conc. Culv. Pipe 24" diam. | 76 | Lin. Ft. | 8.00 | 608.00 | 3.75 | 285.00 | 4.00 | 304.00 | 6.00 | 456.00 |
| Std. Reinf. Conc. Culv. Pipe 36" diam. | 228 | Lin. Ft. | 10.00 | 2,280.00 | 6.00 | 1,368.00 | 7.00 | 1,596.00 | 9.00 | 2,052.00 |
| Mechanical Tamping | 97 | Hour | 6.00 | 582.00 | 6.00 | 582.00 | 5.00 | 485.00 | 6.00 | 582.00 |
| Wire Fabric Reinforcement | 3,449 | Pound | .18 | 620.82 | .10 | 344.90 | .12 | 413.88 | .20 | 689.80 |
| Ballast | 1,342 | Ton | 1.50 | 2,013.00 | 2.00 | 2,684.00 | 1.00 | 1,342.00 | .90 | 1,207.80 |
| Base Course Surfacing | 1,187 | Ton | 1.80 | 2,136.60 | 2.00 | 2,374.00 | 1.40 | 1,661.80 | 1.20 | 1,424.40 |
| Cutback Asphalt Type RC-2 | 3,336 | Bbl. | 4.50 | 15,012.00 | 4.40 | 14,678.40 | 5.00 | 16,680.00 | 5.00 | 16,680.00 |
| Processing Base Course Surfacing | 138,000 | Sq. Yd. | .08 | 11,040.00 | .053 | 7,314.00 | .05 | 6,900.00 | .07 | 9,660.00 |
| Oil Processed Curb | 2,528 | Lin. Ft. | .40 | 1,011.20 | .30 | 758.40 | .50 | 1,264.00 | .90 | 2,275.20 |
| Sub-Total, Schedule No. 1 | | | | $43,245.62 | | $36,387.20 | | $37,084.18 | | $40,821.20 |
| *Schedule No. 2* | | | | | | | | | | |
| Rolling—Steel Tired Roller | 280 | Hour | $5.00 | $1,400.00 | $5.00 | $1,400.00 | $5.00 | $ 1,400.00 | | |
| Blended Rock Asphalt Surf. Course Mod. Mix | 6,276 | Ton | 9.25 | 58,053.00 | 9.40 | 58,994.40 | 9.60 | 60,249.60 | | No |
| 200-300 Asphalt (For Seal Coat) | 14 | Bbl. | 4.50 | 63.00 | 5.00 | 70.00 | 10.00 | 140.00 | | Bid |
| Aggregate—Seal Coat | 18 | Ton | 4.00 | 72.00 | 8.00 | 144.00 | 10.00 | 180.00 | | |
| Sub-Total, Schedule No. 2 | | | | $59,588.00 | | $60,608.40 | | $61,969.60 | | |
| *Schedule No. 3* | | | | | | | | | | |
| Rolling—Steel Tired Roller | 369 | Hour | $5.00 | $1,845.00 | $5.00 | $1,845.00 | | No | $6.00 | $ 2,214.00 |
| Hot Plant Asphalt Surfacing | 9,413 | Ton | 3.00 | 28,239.00 | 4.50 | 42,358.50 | | Bid | 4.00 | 37,652.00 |
| 200-300 Asphalt (For Hot Plant Asphalt Surfacing) | 3,288 | Bbl. | 4.20 | 13,809.60 | 5.00 | 16,440.00 | | | 4.20 | 13,809.60 |
| 200-300 Asphalt (For Seal Coat) | 762 | Bbl. | 4.50 | 3,429.00 | 5.00 | 3,810.00 | | | 6.00 | 4,572.00 |
| Aggregate—Seal Coat | 1,273 | Ton | 4.00 | 5,092.00 | 6.00 | 7,638.00 | | | 7.00 | 8,911.00 |
| Sub-Total, Schedule No. 3 | | | | $52,414.60 | | $72,091.50 | | | | $67,158.60 |
| Sub-Total, Using Schedules Nos. 1 & 2 | | | | $102,833.62 | | $96,995.60 | | $99,053.78 | | |
| 10% Engineering & Contingencies | | | | 10,283.36 | | 9,699.56 | | 9,905.37 | | |
| Totals | | | | $113,116.98 | | $106,695.16 | | $108,959.15 | | |
| Sub-Totals, Using Schedules Nos. 1 & 3 | | | | $95,660.22 | | $108,478.70 | | | | $107,979.80 |
| 10% Engineering & Contingencies | | | | 9,566.02 | | 10,847.87 | | | | 10,797.98 |
| Totals | | | | $105,226.24 | | $119,326.57 | | | | $118,777.78 |

Contract awarded to Brown Brothers. Total Contract Price, $95,660.22.

Crushed gravel was trucked from a nearby pit, in which were a ⅝-yd. shovel and semi-portable 10x36 crushing plant. Stockpiled material was dozed to the hopper jaw. Material was broken on a No. 4 screen, the two bins being regulated to supply 65 per cent passing No. 4.

Hot-mix was placed in a 1½-in. compacted layer using a bituminous paver equipped with a blade which feathered the mix to zero thickness in the outer 6 in. of width. Two 8-10

Placing 1½-in. wearing course near an intersection

Base stabilization was placed 2 ft. wider than the surface course, both layers beveled at edges. Shoulders were then raised to the new level

ton asphalt rollers were used. The beveled edges were compacted by running the wheels of a motor grader along them. The surface was sealed with .24 gal 200 pen. hot asphalt and 20 lb. chips per sq. yd. of surface.

The details of Brown Brothers' $95,000 contract are given in the table of bid items.

### Follows Historic Route

It is of interest to note that the foregoing job is along a section of U. S. 85 which roughly follows the pioneer Santa Fe trail. The new road partly parallels the Santa Fe main passenger line along famous Glorieta pass, elev. 7437 ft., highest point on the rail line. Nearly all of the highway project lies above 7,000 ft.

The relocation route was determined upon after a study of planning survey data, and an economic analysis of the saving in vehicle operating cost. Normal average traffic on this main N.E.-S.W. artery is about 700 vehicles daily, including 35 per cent out-of-state vehicles and numerous light pick-up trucks popular in this locality as family cars.

W. E. Brown was project engineer for the New Mexico highway department of which F. G. Healy is state highway engineer.

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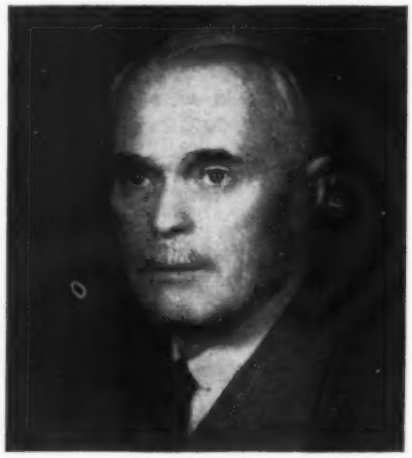
Prospective purchasers of new heavy-duty trucks in makes and models no longer available from production in 1944 may make application at once to their ODT district offices to purchase such vehicles out of production slated for 1945. Applications for heavy-duty vehicles now in stock or to be made in the remainder of this year will continue to be accepted, and those approved expire Dec. 1.

## J. S. Bright Appointed Deputy Commissioner of PRA

Appointment of J. S. Bright as Deputy Commissioner in charge of the Department of Construction and Maintenance of the Public Roads Administration is announced by Thomas H. MacDonald, Commissioner of Public Roads. Mr. Bright succeeds H. K. Bishop who has been in charge of construction and maintenance activity for many years. Mr. Bishop has reached retirement age but will continue to assist in the general activity of the organization as Special Consultant until the end of the year.

Mr. Bright assumes his new duties with a wide experience in highway construction. In 1942 and 1943 he directed American and Canadian contractors working under the Public Road Administration in the construction of the Alaska Highway.



J. S. Bright

He graduated in engineering at the University of California in 1901. For four years he engaged in railroad work. From 1905 to 1917 he was employed by the San Bernardino County Highway Department, his last position being chief engineer. While holding this position he engaged in other county and municipal engineering work. He was employed by the Public Roads Administration (then the Office of Public Roads) in 1917 when the Federal-aid highway program was first launched. Since that time he has taken a prominent part in the highway work of the Federal Government, first in organizing and planning the program and later in administering large annual Federal-State construction programs.

From 1919 to 1922 he was District Engineer in charge of all Federal-aid work and construction of roads in national forests in Colorado and Wyoming and for a short time in New Mexico. Thereafter he was Chief Construction Engineer at the Regional Headquarters in San Francisco supervising Federal highway work in six western districts covering the Rocky Mountain and Pacific Coast areas. In the course of this work he gave particular attention to construction of roads in national forests and national parks and gained a wide experience in construction of roads in remote and mountainous areas that particularly fitted him for the work he was to do later on the Alaska Highway.

When Federal-aid for highways was extended to Hawaii in 1924 he went to Honolulu, organized the Public Roads office established, and initiated the planning of the road system that is an important element in island defenses.

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## Illinois Group Forms to Fight Diversion

Representatives of a score of statewide Illinois organizations met in Chicago recently and formed the Illinois Good Roads Federation to campaign for a constitutional amendment to prevent further diversion of gasoline tax and motor license funds for non-highway purposes. J. H. Braun, general counsel for the Chicago Motor Club, was elected chairman, and Harry L. Robinson, Illinois Petroleum Institute, Springfield, is secretary.

Over 63 million dollars of Illinois highway revenue was transferred to school and relief funds between 1934 and 1940 and another 27 million is committed for payment on relief bonds through 1954. Twelve percent, or $3,502,000, of the $29,413,000 gas tax proceeds of 1943 was drawn on for relief bonds.

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## CAA Submits Billion Dollar Airport Program to Congress

The Civil Aeronautics Administration on Nov. 28 submitted to Congress a national airport plan which calls for the construction of 3150 new airports and the improvement of 1625 existing airfields at an estimated cost of $1,021,567,000 for clearing, grading, paving, lighting and radio facilities, plus another $230,000,000 for land and buildings other than hangars.

Under the plan, the projects would be constructed in a period extending 5 to 10 years after the end of the war, with the Federal Government bearing half the cost and the states and their subdivisions the other half.

The report recommended an immediate Federal appropriation of $3,000,000 for surveys and other preparatory work.

# Go-Ahead Flashed on Chicago's Congress Street Superhighway

THE long-discussed $45,000,000 Congress Street superhighway to lead from Chicago's downtown "loop" through the West Side is assured of early post-war construction by a recent decision of the State of Ilinois to participate in financing this project.

Announcement of the state's decision was made recently at a conference of state, county, city and federal highway engineers called by Governor Green.

Among the engineers who will cooperate in pushing this project are Wesley W. Polk, chief state highway engineer; Philip Harrington, Chicago commissioner of Subways and Superhighways; Oscar E. Hewitt, Chicago commissioner of public works; Lloyd M. Johnson, Chicago commissioner of streets; George A. Quinlan, Cook County superintendent of highways; and James Voshell, PRA dist. engr.

The state, which has a limited veto power over such projects, heretofore has refrained from committing itself to financial participation pending the ironing out of questions regarding right-of-way location. The city and the county, however, had reached general agreement with respect to location and plans, and allocated a total of approximately $16,000,000 of their motor fuel tax funds to the project.

The Governor's action in obligating the state to financial participation in the project removed the last major obstacle to the start of construction as soon as men and materials are available. The city has acquired, through its expenditures for land, all of the right-of-way from downtown State St. to the river, except for certain land owned by the Western Union Co. and by the Rock Island and New York Central railroads. Expenditures for right-of-way now total $2,198,314, all approved by the state. The city is now proceeding to purchase right-of-way from Des Plaines St. to Ashland Ave., and to prepare specifications and construct plans for sections of the expressway, and a bridge over the Chicago River at Congress St. The county is ready to purchase right-of-way from Canal St. to Des Plaines St. and to start work on plans and specifications.

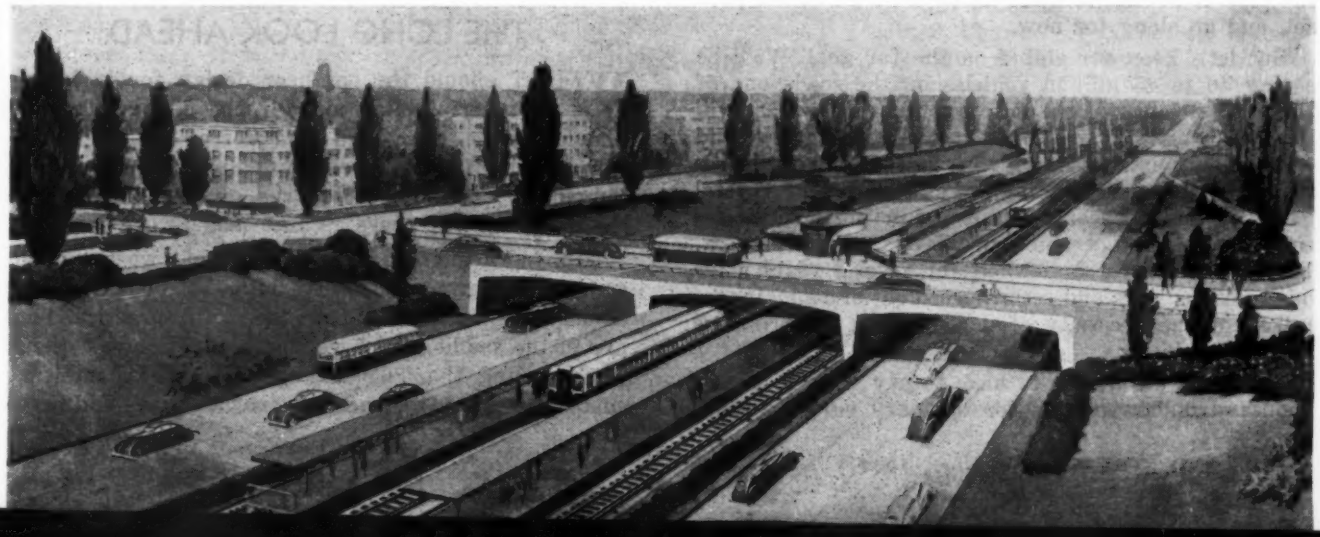
Proposed traffic distributor plaza for the west superhighway between Franklin and Wells Sts. The proposed extension of Wacker Drive to Congress Street is also shown

The route agreed upon is to go through the post office as originally planned, using a portal that was provided for by mutual agreement when the post office building was constructed. The only question not settled is the amount of state funds to be allotted to the project, but this will be determined as soon as it is known how much new federal aid for highways will be available to Illinois.

When completed the Congress St. superhighway will extend from the lake front drives east of the loop to the western Cook County limits, connecting with the Federal inter-regional highway system. It will be one of the most modern and extensive through-traffic highways in the world.

It will be a combination 8-lane superhighway with an electric subway-rapid transit facility in the middle of the depressed highway; and not a single red light from the loop to the county limits. Intersecting streets will be bridges over the depressed thoroughfare and ramps at convenient distances will provide access from local service drives to the superhighway motor lanes. As agreed upon, the plans call for a 4-track subway-rapid transit facility in the center of the depressed street, and 4 lanes for vehicular traffic, passenger automobiles and buses in each direction.

Proposed west side subway—rapid transit improvement in conjunction with the proposed west superhighway



# Editorial

## CHRISTMAS PRESENT

BY the time you read this the nation will finally have a billion-a-year post-war state-federal highway program on the books. The long-suffering road bill lay on the President's desk as we went to press, and indications were that he would sign it.

History will eventually record the importance of this measure. And millions of citizens in a nation on rubber tires, on future Christmases when this war is only a searing memory, will give thanks for the safety, travel freedom and economic benefits afforded by tens of thousands of miles of new modern highways.

### Now to Work . . .

Now to really get down to work, states, counties and cities which have "waited on Washington" now know what federal funds they can expect for the first three post-war years, and should push construction plans with all possible ingenuity.

While the shelf of ready plans is nearing the half-billion mark and has been growing at the rate of about thirty million dollars a month, that isn't fast enough. And the picture is still spotty. Hundreds of smaller cities, scores of counties and a few states continue to lag. Their officials must examine afresh all possible avenues for speeding up surveys and designs.

If there had been a difference of opinion among highways organizations that difference has fortunately disappeared. Many groups with divergent interests were drawn together on the final bill, and this harmony is one of the most constructive things to come out of the long legislative effort. Those who say the bill wasn't big enough can be consoled by the fact that it does insure resumption of road building along sound policies and principles. The amount of funds, either in total or for any one state, is of secondary importance to that fact, and later perhaps the need for larger funds can be demonstrated.

### Also to Think of the Far Goal

With the signing of this bill, road builders can plan to roll up their sleeves for the biggest money-volume of road construction in history. Having smoked the pipe of peace, we must all be satisfied at the pace set, and go along for now.

But let's keep our sights on the far goal. We'll be seeing 40 to 45 million vehicles on the roads one of these days. Much of the nation's highway system will have to be rebuilt in the next quarter century, and we're likely to start the job with 50 cent dollars. Hardly anyone in road building, whether amateur crystal gazer or trained economist, is predicting a quick return to 1940 wage and price levels after the war. Prices stayed on a high shelf for several years after our previous wars and recent presidential campaigners talked of the necessity of a continuing high income rate after this one.

Suppose we continue to have to pay sixty to eighty thousand dollars a mile for ordinary rural two-lane high-type roads, with heavy grading and right-of-way costs taking the price on up from there. Even though some deflation in present high costs is likely to occur, *our long-range or background thinking should be in terms of more funds. A billion a year state-federal program, or even three billion, isn't excessive. Five billion annually would be money well invested in roads for which this nation would someday be thankful.*

### Higher Gas Taxes?

If prices and wages stay high, the blunt fact is that gas taxes or license fees or both will have to be increased in some states. This hush-hush subject has come out in the open in California, where we understand the leading motor clubs, state association of supervisors, California League of Cities and state Chamber of Commerce are behind a plan to introduce a bill this winter for a 1½-cent increase in the gas tax. The proceeds, to be earmarked for expressways and high-type roads, would be spent in the counties where the funds originate. Californians are merely being realistic in this move. They know that even before the war the deficiencies in their state road system weren't being corrected as fast as they were developing. War-worn roads must be rebuilt. Bold freeways are in the detailed planning stage for the metropolitan centers. These things take money and Californians are making no little plans.

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## FEDERAL AID FOR RIGHT OF WAY

Congress has balked at letting federal highway funds be used for buying right of way. However, such provision is now included in the new road bill.

A main purpose in passing a federal road program at this time is to make possible a speedy, full scale resumption of road building when war ends. Delay in purchase of right of way due to lack of funds, is holding up a good many vital post-war urban projects today. Federal help on land purchases will help swell the shelf of ready plans faster.

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## THE LONG LOOK AHEAD

WHAT should the engineer design for in laying out arterial highways for the post-war world? Should he go overboard and force 300-ft. rights-of-way and 100 mile-per-hour alignments onto his community willy-nilly, or serve up 1941 models for the first post-war years as auto makers are doing?

Highway leaders have a feeling that we are at an end of one great period of highway evolution and about to embark on a new one. But practical men are in the saddle, thank goodness, and many of them, remembering the '20's when new-fangled bond-issue concrete was laid around fence corner turns and prog-

ress thus frozen for years, are busy chewing this subject over right now.

And so are officials in the cities, where perhaps the most radical changes in design conceptions are in store. Hence, they listened with special alertness to the counsel of H. S. Fairbank, of the Public Roads Administration, at the Public Works Congress recently. Mr. Fairbank didn't attempt to lay down any rules or dimensions but urged fuller consideration of long-time goals. He sees the proposed Interregional Highways not as a new order of construction superimposed on present roads, but rather as projects that will represent a gradual refining development of the existing primary system.

Especially in limited access areas, the attitude must be flexible. State authorities must have the legal power to use it at their discretion.

This is a time for bold conceptions—tempered and tested, however, against all available economic data and projection of traffic curves. In Mr. Fairbank's words, more allowance needs to be made in early planning for changes certain to come with future traffic growth.

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## NAVY MUST HAVE CONSTRUCTION MEN

THE Navy urgently needs more Construction Battalion Officers and all engineers who feel they are qualified should contact the nearest of the seventeen Naval Officers Procurement Offices. This is urgent and the special need is for men capable of organizing and directing work. Many men from the ranks of road building are already rendering distinguished services in the Seabees. This may be your best way to help the war effort.

## Illinois Road Builders Hear State Road Outlook

Members of the Illinois Road Builders Association in their annual meeting in Chicago December 4, elected the following new officers for 1945:

President: Donald O. White, pres. of White Consolidated, Chicago; vice-pres.: L. L. Shidler, Triangle Const. Co., Kankakee; treas.: A. R. Ramser, Standard Paving Co., Chicago; Secy.: A. B. McDonald, of Woodstock, Ill. Taylor Soper is exec. secretary.

Hon. Jennings Randolph, Congressman from West Virginia and good roads leader, was the banquet speaker.

### Illinois Had $9,800,000 Construction Year

Afternoon speakers included C. M. Hathaway, construction engineer, Illinois Division of Highways, who summed up 1944 road contract work in the state and also the 1945 outlook.

State road improvements performed by contract during the past year included four classes of work as follows: reconstruction of worn-out sections of the strategic network, patching of concrete pavements, bituminous resurfacing of concrete and other pavements, and access roads.

Reconstruction completed totaled $1,527,000. Contracts on Routes 66 and 29 were awarded in the amount of $3,648,000 of which about 20 per cent will be completed at an expenditure of $757,000.

Patching contracts included 783 miles of pavement, at $1,358,000. This is the third year of a state-wide concrete pavement patching program which is giving a substantial part of the state system increased service life.

Resurfacing with hot-mix totaled 177 miles, at $3,750,000, and 271 miles of seal coat was applied, mostly to old bituminous secondary roads at $682,000.

Only $577,000 was expended for access roads. Bridges and miscellaneous $1,151,000.

### Over 1,000 Miles Urgently Need Replacement; Equipment Trends

While not being able to predict definitely the mileage of 1945 work, Mr. Hathaway said that over 1,000 miles of Illinois primary roads are so obsolete in design and safety and so far beyond their economic life that replacement is urgently needed.

Touching on future trends, he foresaw an increase in use of truck-mixers on patching, bridges and culverts, and predicted strong post-war competition between membrane curing and burlap and paper. If membrane curing is to continue, he said, there must be developed proper tests for controlling its effectiveness and equipment to insure uniform application.

In pavers the 34-E dual drum will become an economic necessity. Hot-mix plants assuring positive control of bitumen will be more widely located to take care of high-type bituminous construction with haul radius up to 25 miles, while road-mix will continue to find favor for secondary roads.

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## Equipment Distributors' Meeting Shaping Up

The over-all outline and many details of the 26th Annual Meeting of Associated Equipment Distributors have been announced. The dates are Jan. 22-24 (Mon.-Wed.), with the 1944 board meeting the 21st, and the 1945 directors meeting the 25th. Place again is Edgewater Beach Hotel, Chicago.

"The 1945 annual meeting will concern itself principally with the surplus property disposal problem," points out G. W. Van Keppel of Kansas City, A.E.D. president. Almost all of Tuesday will be devoted to Surplus Government-Owned Construction Machinery. Among speakers will be E. P. Phillips, director, Construction Machinery and Farm Equipment Section, Treasury Surplus Property division, and Thomas S. Holden, president, F. W. Dodge Corporation. A number of distributors and manufacturers will participate.

The general meeting will open Monday morning with an Early Bird breakfast, sponsored by the A.E.D. of Kansas City. This will be followed by nomination of directors and officers for 1945, committee reports and speeches by A. F. Garlinghouse of Los Angeles, Saul Gottesmann of New York and Vice President A. E. Hahnan of Atlanta, Georgia. Jay Maish, Advertising Executive, will speak on "Distributor Advertising."

Wednesday's program will include speakers of national importance, within and outside the industry, including G. M. McGee, Research Engineer, Association of American Railroads; George Dimond, Insley Manufacturing Company; E. P. Palmer, Chairman, Construction Committee, U. S. Chamber of Commerce; Major-General Eugene Reybold, Chief of Engineers; and William E. Warne, Assistant Commissioner, Bureau of Reclamation (both on Post-War flood control and reclamation), and Lowell Swenson, Manager National Aeronautics Association, "The National Airport Program and Markets for the Sale and Rental of Construction Equipment."

The annual banquet will be Tues. the 23rd, announces 1st v. p. H. O. Penn of New York. Carol Winchester, Secretary, is arranging details.

# JOB and EQUIPMENT IDEAS

***Labor and time saving job kinks and interesting construction features, noted by R & S editors in their travels or sent in by readers. Send in your suggestions with sketches or snapshots.***

## Scraper's Rear Wheels Don't Match But She Works

If you've never seen a LeTourneau 16-yd. scraper with two sizes of rear wheels, you should have dropped around and paid a visit to Laudermilk Bros. during their grading job on U.S. 6 and 24 east of Grand Junction, Colorado. When the superintendent ran plumb out of tires for one of his 16-yd. rigs, he decided that rather than put it on the sidelines, it would be better to retire a 12-yd. carryall instead. So the smaller machine was robbed of a pair of its rear wheels, which were installed as right rears on the bigger unit. To do the trick the left rear axle shaft was raised and the right axle lowered to make up for the differences in tire diameter. This involved machining and welding on special offset axle supports as partially shown by the arrows.

## Leveling Asphalt at Concrete Base Joints

When a bituminous blanket is laid over an old concrete pavement, extrusion of filler at the concrete expansion joints is certain to leave a wrinkle in the black top surface. There's little choice as to how to iron out these spots. The main thing, according to maintenance men in the Pennsylvania state department of highways, is to get at these places promptly and systematically and adze down the high spots by hand. Two men work together on this work, one adzing and one brooming away loosened material and checking with a straightedge. The area is then given a seal mopping and chips or sand.

## Road Magnet Built to Travel 10 MPH

Reports C. L. Motl, maintenance engineer, Minnesota department of highways, St. Paul:

Ever since the war started the Minnesota department of highways has been trying to purchase a road magnet. We finally decided to secure the units separately and make up one ourselves. The result I believe is a little different than units being used for similar purposes in other states. The various sub-units that went into the assembly are as follows:

I.H.C. 1½-ton truck, Model 301-S (used).

General Unit: One 2½ K.W. 110 Volt, D.C., portable elect. 7 H.P. gas engine power plant, Model W2D, manufactured by D. W. Onan & Sons Co., Minneapolis, Minn.

Magnet Unit: 2½ K.W., 96 in. long x 18 in. wide, built to Minnesota department of highways specifications by the Stearns Magnetic Mfg. Company of Milwaukee, Wisconsin.

The lifting device consists of a hand-operated hydraulic pump, Blackhawk Model P-63, and two 2¼ in. dia. x 12 in. hydraulic rams, such as are built and used by the department of highways for plow lifts.

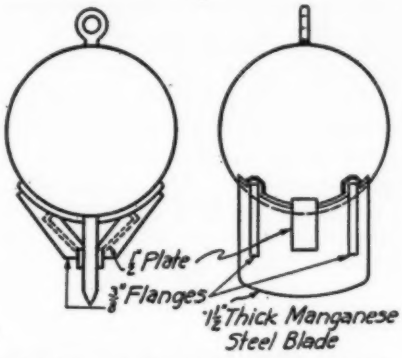
This unit complete weighs 4½ tons, with 3½ tons on the rear axle. The magnet is quickly adjustable up and down by means of the hand hydraulic pump, and ordinarily it is operated about 3 in. above the road level, and does good work at speeds up to 10 mph. This I believe is somewhat faster than is ordinarily possible with conventional type magnets.


## Knife Welded on Ball Breaks Old Pavement into Squares for Revetment

Old concrete pavement removed by J. A. Terteling & Sons on their Nehalan Highway contract, Astoria-Naval Hospital section, near Astoria, Oregon, was taken up in neat rectangles and later placed as embankment paving along the bay. In order to get the concrete broken into even, rectangular shapes, a manganese steel cleaving edge was welded onto the bottom of the firm's 24-in. skull-cracker ball, as shown in the photo and sketch. The ball was hoisted and dropped with a tractor winch and side boom.

## Utility Lines Suspended From Pole

Seen on the Detroit Industrial Highway work last summer was this simple means of suspending utility lines in place during excavation for new drains and an adjoining bridge abutment. The contractor simply laid a 70-ft. wood pile across from bank to bank and suspended the boxed in utility lines from the pile with pieces of wire. The pole was cleated to bedding planks to hold it in place.




Terteling's pavement breaking outfit, and concrete bank pavement made with fragments of concrete carefully broken into rectangles

# State Highway Officials Meeting

## Good legislative news, arriving from Washington during the Cincinnati AASHO convention, spurred committee sessions and speakers as 740 gathered to air current and post-war problems. Notes on a random selection of the many papers and topics

A STRANGE "new" attitude existed as road men gathered for the 30th annual convention of the American Association of State Highway Officials at Cincinnati, Nov. 27-30. Or maybe it was an old feeling reborn. Little time was spent selling the need for a big post-war road program, because such a program already was in the lap of the gods (Washington variety). The attitude was one of "let's look at what we've accomplished these 25 years, as an axis to project into the future, and get on with our work-a-day committee problems of planning and building better roads."

If this editor emerged from the meeting with any one uppermost conclusion, it was this: **Complex big-city traffic problems will occupy more and more attention of highway engineers, to be sure, and post-war federal appropriations will earmark funds for urban and secondary as well as primary state highways. But state highway departments must remain in a pivotal position in road administration. The nation is fortunate in having strong, enlightened state highway departments in most (not all) states. Even more fortunate is the fact that these departments have been fused into a national group offering means of advising intelligently on federal legislation and working toward uniform highway technical advancement through energetic committees.**

### Pres. Hadden's Address

Retiring president Samuel C. Hadden in his "ex-augural" address, summed up AASHO's past year by observing:

"We can look back over a year of substantial progress in the attainment of the primary objectives of our Association. Our Washington, D. C., office has been reorganized, our committee work revitalized, our constitution and by-laws revised.

"Our non-legislative activities have been charted, our relations improved with the many national organizations concerned with the development and use of the public highway system.

"The right of state highway departments to do much important highway maintenance, repair, and construction work during the war is now firmly established, with the official sanction of the appropriate agencies of the Federal government.

"And our legislative program has been rationalized, publicized, and made acceptable to the politicians, the public, and the press, and is now (Nov. 28) in Congress where its final enactment into law at a very early date is an assured fact."

Turning to the immediate job Mr. Hadden reminded that although we are deeply engrossed in post-war highway planning much important highway work can and should be done while the war is still in progress. Not all highway work can be judicially deferred until the end of the war. Many of our older highways are failing under wartime loads, and their rehabilitation is truly essential to the successful prosecution of the war and the conservation of vehicles and tires.

Continued President Hadden: "Some of the states have already made very good use of revised Conservation Order L-41 and it is available to all. **For example, in one state, in strict conformity with provisions of the revised order, contracts were awarded for 3¼ million dollars of road widening and 5½ million dollars of resurfacing during 1944.** This class of necessary work is performed with a minimum of labor and equipment since it does not involve changes in line or grade, roadbed widening or reconstruction of drainage structures. **It is also very desirable as a means of holding together contracting organizations and other elements of the highway industry upon which we shall all be dependent for the undertaking of our post-war highway construction programs.**

"We have learned as a result of our present war experience that a nation must defend itself and wage war with the highways it has at the outbreak of hostilities. It is indeed fortunate that our highway systems were in such excellent condition at the outbreak of the war, for the stop-construction orders of 1941 and 1942

### New AASHO Officers

Mr. Herman A. MacDonald, Massachusetts, President
Mr. Hal G. Sours, Ohio, First Vice President
Regional Vice Presidents:
Ezra B. Whitman, 1st Dist., Baltimore, Maryland
C. W. Phillips, 2nd Dist., Nashville, Tennessee
W. W. Polk 3rd Dist., Springfield, Illinois
Burwell Bantz, 4th Dist., Olympia, Washington
Executive Committee:
R. H. Baldock, Oregon
C. W. Brown, Missouri
T. H. Cutler, Kentucky (new)
F. E. Everett, New Hampshire
S. C. Hadden, Indiana
M. J. Hoffman, Minnesota
T. H. MacDonald, Public Roads Adm., Washington, D. C. (new)
C. H. Purcell, California
H. E. Sargent, Vermont
F. R. White, Iowa
J. S. Williamson, South Carolina
George H. Henderson, Rhode Island, Treasurer

**The Two MacDonalds**

Herman A., Commissioner, Mass., new AASHO president, and Thomas H., U. S. Commissioner of Public Roads, who was honored for 25 years of distinguished service

would otherwise have precipitated a chaotic condition in a loosely coordinated highway transport industry.

"The idea of building new military highways, which was somewhat prevalent in the early days of the war, soon gave way to the hard circumstances imposed by war shortages. An important but small mileage of defense access highways was constructed in 1944, but in the early months the outlook for essential construction and highway betterments was indeed gloomy. However, a meeting with war and navy and WPB officials led to an understanding which permitted state programming of projects proposed for construction in 1944 to be submitted to WPB in lieu of submitting one by one. Under this plan, approval was granted for nearly $70,000,000 worth of essential projects in 34 states to Nov. 1."

## Past 25 Years Reviewed

The first afternoon general session was given over to a review of federal aid, and some forecasting. A paper on the history of federal aid legislation, by Senator Carl Hayden, was read by Bernard Touhey, state high engineer of Arizona.

Federal aid from the state viewpoint was reviewed by R. H. Baldock, state highway engineer, Oregon, who pointed out that highway development has been founded on the stuanch rock of state-federal cooperation. Of the Public Roads Administration and its predecessor organization, he said, "It is to the imperishable credit of the Federal agency that it has at all times administered the federal aid laws in the spirit of cooperation and equal partnership in which they were written."

Rather than demanding uniform excellence among the earlier 48 state highway departments, he noted that in earlier years weak departments were encouraged by suggestion and example to build up strength and efficiency. Stage construction of less than desired standards of design was also permitted in those years, rather than rigidly insisting on a pace of engineering approach above the ability of some states to follow.

Mr. Baldock joined in paying tribute to Thomas H. MacDonald, Commissioner of Public Roads, who has held the federal leadership since 1919 when the U. S. Bureau of Public Roads was set up in its present form. Commissioner MacDonald was presented with a testimonial for his statesmanship by Fred R. White, chief engineer, Iowa Highway Commission.

Mr. Baldock cited "one and perhaps only one respect" in which the Federal agency might have acted more liberally, i.e., in right-of-way standards. Inadequate existing widths today represent one of our most serious highway difficulties.

In reviewing the questions of apportionment and matching of federal highway funds, Mr. Baldock tried to show the fairness of the 50-50 matching policy, and that uniform highway advancement has resulted. On the states' ability to match funds he said: **"In the entire history of the federal-aid program only two states have failed to match every year's apportionment; one of these failed in only one year and the other has failed because of excessive debt burdens assumed in behalf of defaulting local agencies; these facts indicate that the aid apportioned has been reasonably consistent with the matching ability of the states."**

Federal aid from the national viewpoint was viewed by Thomas H. MacDonald. In tracing the development of our federal-aid system since 1916, he contrasted the early confusion over route selection and national objectives with the present clear conceptions. The first designated system, totaling 168,881 miles, was published in 1923 with the prophecy that "this plan for improvement of the nation's main highway would be possible of execution in not more than 10 years to permit unobstructed traffic between all cities of 5,000." Ten years later the system had grown to 231,176 miles, 98 per cent improved and half to high standard. This and subsequent achievements he credits first to the rapid development of able, efficient state highway departments.

Employment records kept since 1931 by the federal agency show that in the 14 years 1931-1944, federal-aid road construction and maintenance have afforded over 3.6 million man-years of direct job employment, and at least 6 million man-years of off-job employment.

Mr. MacDonald commended the states in their speed in building defense access roads since 1941. He also lauded their foresight in pushing post-war plans. State highway plans for post-war jobs, completed as of Oct. 1, represented $398,000,000 construction cost, or up 30 million in a month; designs were under way for $1,162,000,000, up 44 million; surveys under way for $1,065,000.

In conclusion the Commissioner visualized the eventual concentration of one-fifth of all highway traffic on one per cent of the highway mileage, represented by an interregional system of free-flowing city-connecting, city-penetrating or city-circumferential routes. Building up this system, along with secondary roads and city expressways, is the new task ahead. **Finally, said Mr. MacDonald, the future of highway development lies in administration. Laboratory and technical work must be better organized to yield the information on which administrative decisions can be made. Both research and administration need sufficient funds.**

The annual George S. Bartlett award for distinguished service in the highway industry was awarded to Charles N. Purcell, director of public works, California. Presentation was made by L. I. Hewes, chief, western region, PRA, the award being given at this meeting because of the cancellation of the annual meeting of the Highway Research Board.

## Looking to Future

Speaking on future highway development from the city standpoint, Wilson Wyatt, Mayor of Louisville, Ky., pleaded for federal aid funds for right-of-way costs. He cited the need for strong cooperation of local governments in urban traffic planning, coupled with continued high degree of home rule.

Off-street parking facilities are a major need in his and other cities. "Streets are the most expensive garage facilities the public can buy," he said. Other urban needs: better connections between airports and downtown, and continual pushing of through arterials. By-passes, though needed, were seen to be of lesser importance.

C. W. Phillips, Tennessee highway commissioner, on the future of state highway development, asked for a plan which would fuse the nation's roads into one transportation system with less consciousness of road classes.

Otto Hess, county engineer, Kent County, Mich., spoke on future county needs. He asked for a county-state-city relationship comparable to the strong state-federal relationship existing heretofore.

## Federal-Local Relations

In discussion, Commissioner MacDonald concurred but questioned the feasibility of a direct federal-local channel of administration. He referred to the last ARBA convention, at which the County Highway Division went on record as wanting some federal supervision through state highway machinery. He agreed that earlier federal-aid funds for secon-

dary roads (largely non-federal trunklines) were well administered. Postwar plans set up by Congress must satisfy all agencies if they are to have a lasting place.

Secondary federal-aid programs established by the present bill will tax state highway departments unless counties contribute funds and engineering service. There has been little county road construction of late and counties should be in good matching position.

"Wise administration of federal aid to counties will result in speeding up county road improvement, raise county construction standards, and lead to better engineering organization," said Commissioner MacDonald, who added, **"About five-sixths of our roads are under local people and any plan that will lead to improving woefully weak county organizations existing in some states will greatly benefit the nation. Wise federal legislation can force betterment through mandatory provisions on engineering control.**

It was suggested that each state might call a meeting of county authorities to explain the provisions, tell them of funds available, and lay the foundation for state-county corporate agreements. A joint committee would work out the details, based on the set-up in force in more strongly organized counties, covering regulations, design standards, etc., and conclusions would finally be submitted to PRA.

**In a recent survey of counties, 75 per cent of those replying said that they prefer some kind of plan which includes state cooperation in the administration of federal-aid secondary road funds.**

## Maintenance and Equipment Committee Considered Many Topics

The Maintenance and Equipment committee, R. H. Baldock (Ore.), chairman, held a running-fire discussion in which numerous valuable fragmentary points on methods were brought out.

H. D. Metcalf, Ohio, gave a paper on his state's practice of resurfacing old concrete pavements with bituminous mixes. Among his numerous points was that mudjacking and subsealing with asphaltic cement, to seal the subgrade under pumping joints, are used not only to correct conditions that occur as deterioration reaches a more advanced stage but also as a part of preparation of the concrete road for resurfacing.

The three types of bituminous reinforcing used in Ohio—seal or skin treatment, road-mix treatments, and plant-mix resurfacing—are selected by considering several factors. Skin treatment is used on sealed pavements which have not yet become very rough and have developed no rocking at joints. Sound, hard aggregates are the main thing here. More seriously sealed pavements that are still structurally sound are given a road-mix treatment if traffic is not too heavy. If traffic is heavy, or structural failure has begun, plant mix resurface is prescribed [See Roads & Streets, May and July, 1943, for articles on Ohio practice].

In discussion, C. M. Ross and G. H. Baker summed up Illinois procedure, which is to patch seriously broken concrete with concrete, widening with concrete where desired, then apply hot mix. Illinois officials have decided that priming concrete before resurfacing is a good thing. The critical point in deciding whether to resurface or reconstruct is the amount of base patching necessary; too much defeats purpose of economy.

The practice of pounding 12-in.-square fragments of broken concrete into the subgrade with a 2,000-lb. hammer dropped 10-12 ft., used on occasions in Ohio and elsewhere, was reported by H. D. Metcalf. Experience in Illinois is that where the soil is highly resilient there is a tendency for the adjacent pavement to raise.

On the problem of separation occurring when widening fills, it was reported (Ind.) that this can be prevented or minimized by widening the bank one year and the pavement the next after stabilization has occurred.

Mr. Metcalf emphasized need of going over every section of old pavement and deciding individually on judgment whether it should be reinforced or rebuilt and how much of the base should be torn out and replaced. In some cases old slabs can be held by road-mix or plant-mix.

## Mower Test Data

"Maintenance of Wide Right of Way," a paper by W. K. Beckman (S. C) and L. F. Johnson (N. H.) gave timely data. In South Carolina only as much width is maintained as is necessary for safety and efficiency. This varies from 30 to 300 ft., 75 ft. being the minimum for 22-ft. pavements and 150 ft. for dual 22-ft. roadways. This year in S. C. $232,000 was spent maintaining right-of-way on 12,000 miles, $200,000 being concentrated along 7,500 miles of improved roads. About 90 per cent of the cost is for moving, which operation has been cut to one-third of normal peacetime practice. A cost study on six sections of road normally maintained showed that a power mowing can cut 7½ acres per 10-hr. day at a cost of $1.66 per acre, including equipment rental. Costs are lower where slopes are flat, and cheapest where gang rotary mowers could be used (requiring relatively flat design slopes). Yearly mowing cost averaged $8.30 per acre on these sections.

This paper emphasized the economy of designing cut and fill slopes flat enough to eliminate hand mowing labor. It gave $1.00 per mile per year per foot of right-of-way width as an average cost of mowing. Fostering of natural growth is recommended along the outer fringes of wide roadside strips such as are contemplated for proposed interregional highways, and some farmer encroachment can often be agreed upon. Doubling right-of-way width virtually doubles mowing cost, and incidentally a 4-lane right-of-way withdraws 180 acres per mile from productivity.

## Baldock on Surplus War Equipment

The surplus war equipment problem was analyzed realistically by R. H. Baldock (Ore.), who anticipated that road equipment would probably be disposed of through trade channels by government agencies designated by a Surplus Property Board. Mail-order methods, employing published lists of standard prices, are likely. These lists would tell warehouse location and offer goods on an "as is, where is" basis. **Mr. Baldock's warning was for purchasers to examine thoroughly before purchase whenever possible.**

About 2½ million dollars of equipment and supplies adaptable to road work may be available. The AASHO Maintenance and Equipment Committee and PRA have determined by questionnaire that state highway departments will be in the market for 55 million dollars' worth of these goods the first year, 15 million the second year.

Although there is now an apparent abundance of surplus war equipment, Mr. Baldock pointed out that swift mechanical development will make much of it obsolete. Highway departments impeded their technical advancement for a decade after World War I by loading up heavily, probably losing more in the long run than they gained through initial bargain prices.

Meanwhile a shortage of graders and certain other units for 1945 highway maintenance looms, as a result of WPB's scaling down the over-all civilian allotment for the nation.

**The states would do better, said H. O. Schermerhorn (N. Y.) to go to equipment manufacturers, specify the equipment they want, pay the high**

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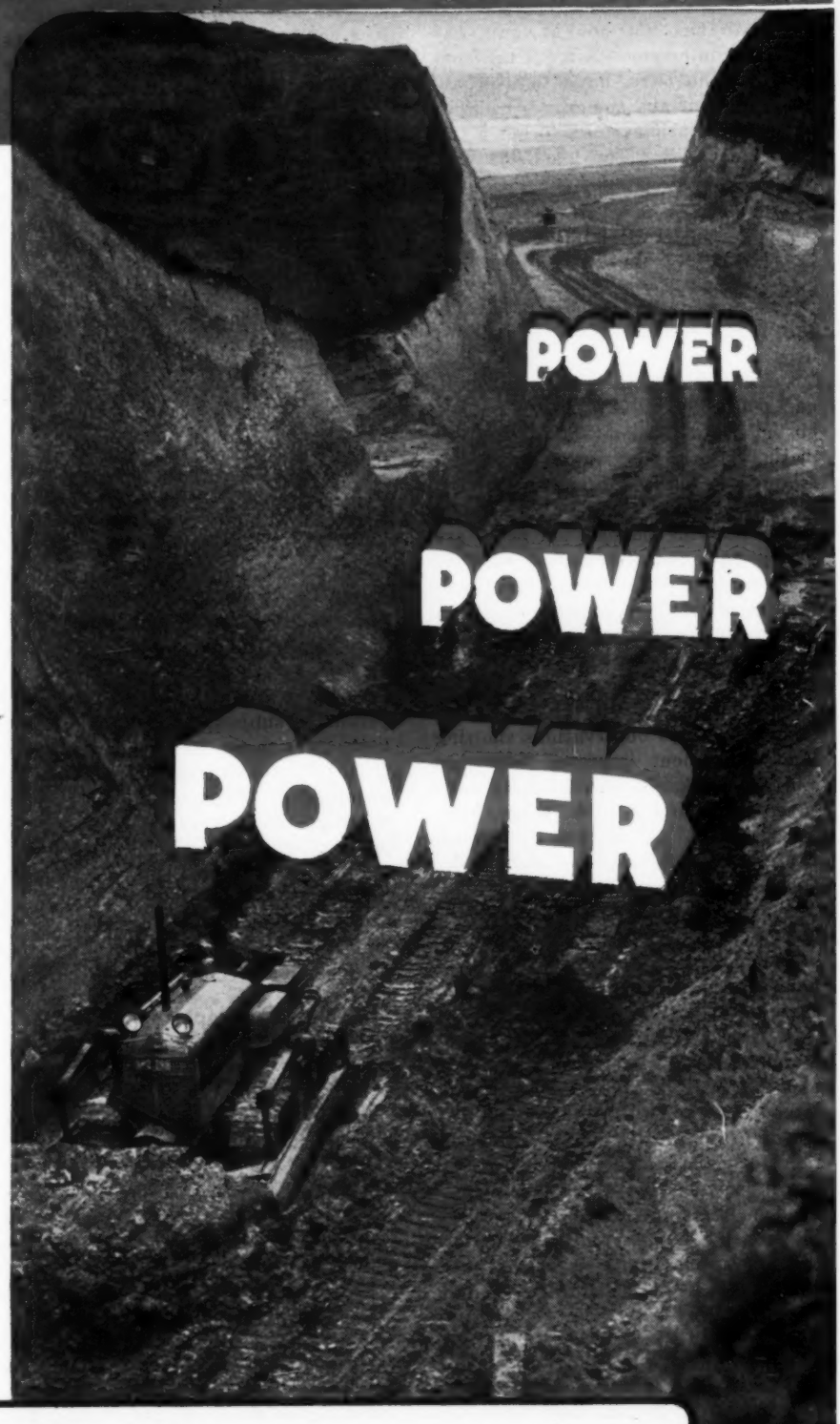


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**prices and know they were getting the most efficient equipment available. He voiced a widespread concern over the "pig in a poke" condition of war trucks and other units. New York's state highway maintenance equipment is definitely down at the heel, especially in trucks, as a result of the war.**

**John S. Evans (Utah) reported that his state has not bought any war surplus equipment. Some Utah contractors who have, have to overhaul all equipment and sometimes combine parts from various units to get a few good machines. "The good has been taken out of these machines," he said.**

### Materials, a Lively Topic

Fragmentary notes from the long series of topics taken up in the Committee on Materials, F. V. Reagel (Mo.), chairman, includes the following:

On soil stabilization with bituminous materials, J. E. Pirie (Tex.) reported use of a modified bearing test in the materials laboratory for determining amount of bitumen necessary to waterproof a given soil. A curve is run showing penetration necessary in dry state and after soil sample has set 5 days in a capillary tank. Road-mix material is reworked to incorporate as much asphalt as possible (4-7%), however with due regard to "fat" formation.

On soil-cement processing, Mr. Reagel reported observations showing that soil-cement improves with age and is remarkably free from the edge raveling common with some bituminous mats. So marked is this advantage that the South Carolina department has considered use of dual construction in which edge strips are of soil-cement.

Stabinol, the waterproofing compound, was subjected to the debate customary with new materials. It was agreed that this material meets manufacturer's claims in that it acts as a waterproofing agent but is not intended to add to mechanical stability of granular mixes. Ohio delegates reported satisfactory experimental use in a wide variety of soils. Conclusions from use on 150,000 sq. yd. in French Guiana pointed to importance of controlling depth of mix, which should be substantial enough to roll against.

### Air Entraining Cement

On air entraining cement an inconclusive discussion took place on the virtues of adding air entraining materials at the mixer or specifying it to be incorporated in manufacture. Ohio cylinder tests showed practically no difference from the strength standpoint, but comment was made that adding on the job was a nuisance and offered control hazards. Ohio state has employed about 500,000 bbls. of air entraining cement to date, now using on all pavements, checking concrete several times daily by the weight-yield method. Others, including Vermont officials, are seriously concerned with the problem of weight-loss control. South Carolina reports no differences in durability or wear on a test section built 4 years ago employing 22 brands of cement, six having vinsol resin.

A spokesman for PRA indicated interest in air entraining concrete for more exposed parts of concrete bridge superstructures, where untimely disintegration has sometimes been observed.

Membrane curing agents also came in for discussion. Opinion was divided on the future of this admittedly economical and effective type of curing, indicating need for an educational job by manufacturers. **One state official who endorsed membrane curing as definitely "here to stay," agreed that use of liquid materials will gain with development of positive methodods of securing uniform application and satisfactory laboratory acceptance and control tests. Importance of agitating drums before sampling or usin gwas touched on.**

Concrete road joint sealing, that perennial subject, was discussed but little agreement was reached except that this is still one of the major unsolved problems of highway engineering. Experiences were presented on rubber compounds, impregnated sawdust, cottonseed hulls, different kinds of wood, portland cement filled asphalt, priming materials, etc. Principal problem: How to get a lasting bond with the concrete.

### Roadside Development Committee Considers War Memorials

The Roadside Development Committee, John L. Wright (Conn.), chairman, heard papers on justification of aesthetic treatment, grasses and seed testing, war memorials and other topics.

George B. Gordon (PRA) on roadside war memorials outlined a new conception of what a memorial can be, recommending the statues and monuments he supplanted by "living memorials" in the form of beautified roadside areas. The sites should be carefully selected for easy accessibility and with regard to the permanency of the road location. Land acquisition, selection of durable tree types, and planning rest and recreation facilities are functions falling to the highway departments.

### Ready-Mix for Specification Study

Cement-concrete pavement specifications was the chief topic covered by the Committee on Road Construction, C. M. Hathaway (Ill.), chairman. Most emphasis was put on ready-mix specifications, which are being further developed by a subcommittee and will be circularized among members of the standing road construction committee for possible adaptation in another year. This is in recognition to the growing popularity of ready-mixed concrete for city paving work, bridges and culverts, curbs, gutters, etc.

### Aerial Surveys in Highway Planning

Aerial photos and their parts in planning and designing roadways was a feature subject at the Road Design committee session. Samuel Nelson, dep. chief engr., Palisades Interstate Park Commission, N. Y., prepared a paper, read by Joseph Barnett, PRA. Cost figures of $570 per mile were quoted from one project. So accurate is the stereo-photo technique today that grading quantities can often be prepared from air maps where no abrupt topographical changes occur, the inaccuracies from station to station being of a compensating type.

### Administrative Committee Considers Truck Weights, Personnel, Limited Access

Under chairman Ezra B. Whitman (Md.), the Administrative Committee held a lively discussion on whether to freeze truck axle loadings at their present limits. Foreseeing post-war rail and air competition, Ivan J. Hilton (N. Mex.) took issue on what he termed to be short sightedness in holding too rigidly to pre-war restrictions, and urged a freer concept of future highway design. A resolution was voted to make a study of this problem and recommendations. G. R. Swift (Ala.) said his state tends to favor the free movement of goods over the highways, but that only Congress could regulate all phases of the weight problem which is now hopelessly snarled up between the 48 states.

The vital importance of attracting able young engineers into road building after the war was covered by W. H. Root (Iowa). **Salary and other inducements offered by various state departments today, as recently surveyed, show that private industry offers greater ultimate pay, retirement benefits and chances for advancement. Political interference is an even more serious obstacle.**

## Resolved, at Recent Highway Officials' Meeting:

That continued financial support of the U. S. Government is justified for the development of the Pan American and Alaska highways to adequate standard and maintenance, for free use by all types of vehicles.

That the Executive Committee of the Association arrange for a study of the problem of truck and bus weight and sizes and recommend reasonable limits to the several states.

That relief be granted to state departments now finding it difficult to get enough equipment and parts, by making units and replacements available to the fullest extent possible without interferring with other essential war needs.

### Limited Access Questions

Limited access road progress in New York state was reported on by Commissioner H. O. Schermerhorn, who foresaw big post-war development in expressways. He pointed to the need for clearer definition of the elements of limited access design and for clearer nomenclature. (New York has many miles of "parkways," for example, but only one short section of "limited access" road completed under a new law defining such a road.)

New York is far advanced on plans for 540 miles of trans-state thruways which will have 4 per cent max. grades. The big problem is to find locations that meet traffic needs with least property damage. Submarginal land areas are to be traversed to save fine farm land, and routes will go near but not through smaller cities.

One project will cost $17,000,000 to construct plus $15,000,000 for land. A project for New York City will cost $55,600,000 for 23 miles.

New York's Thruways will have interchanges every 10 to 15 miles in open country and two to five interchange points within each larger city. Other standards:3 degrees max. curvature, 1,000-ft. min. sight distance, 200-ft. right-of-way fenced throughout, 20 ft. min. center mall.

On use of consulting engineers in highway design, Spencer Miller (N. J.): the necessity to employ such outside talent spotlights the need to raise department salary standards. Ezra B. Whitman (Md.): Use of consultants on big special projects often can save necessity of expanding state forces temporarily (deflation later not always being easy). Also mentioned:

*(Continued on page 72)*


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## HAZARD LAY·SET WIRE ROPE

## AASHO Meeting

(*Continued from page 69*)

there is a morale problem when poorly paid state highway people work alongside higher paid "outsiders."

Geo. T. McCoy (Calif.): Los Angeles city staff personnel has been assigned to help the state in designing the Los Angeles post-war Freeway project.

Spencer Miller (N. J.) on progress in post-war plans preparation: Recent admonitions to spur effort have borne fruit, over $1,460,000,000 of state road projects being "ready" or in the design stage with more states well along. Urban centers are the chief laggards. The complex big-city traffic problems need tackling with a fresh perspective and consultants often are very helpful in this respect, in addition to being able to offer the varied non-highway experience (railroad, tunnel, etc.) usually required.

### How Distribute Funds?

On the question of proper distribution of state funds to the state, counties and cities, T. H. Cutler (Ky.) urged an analysis of comparative traffic within the state. Changes in need must be foreseen and estimated, and due allowance made for the difference in cost of building and maintaining the road types needed in each jurisdiction. Much fund apportionment is now based on unsuitable factors such as area, total population, assessed valuation, relative motor revenues, etc. He recognized only two suitable factors: state highway, county truck and arterial city street mileages; and motor vehicle registration. Five per cent of all funds should go to the highway department for administration, irrespective of allocation of the remaining 95 per cent, he recommended.

Hal Sours (Ohio) reiterated the urgent need of expressways in larger cities, where peak traffic flow still creates daily snarls. He counsels city planners to waste little time in costly attempts to solve congestion merely by widening streets. Expressways should be located through blighted or undeveloped urban areas to minimize property damage and right-of-way costs. Downtown terminal facilities are a neglected problem, and planning of limited access to discourage outlying "ribbon development" in the face of pressure elements is a chief difficulty. Expressway costs should be discussed in terms of cost per person served rather than per mile of road. Per-person costs are often lower for expressways than for secondary rural roads.

Origin-destination surveys and other advance data must be studied thoroughly to help remove the guesswork from route selection, and completed before offering designs to the public. [Ohio state has completed an O-D survey in Cleveland, a partial one in Toledo, and will soon undertake one in the Cincinnati area jointly with Kentucky and the cities involved.]

On recent new road construction H. O. Schermerhorn (N. Y.) revealed that his state has let only one contract involving state road funds in the past two years, a $75,000 bridge repair job. Some 450 miles of plant-mix bituminous resurfacing in the period handled was by state forces. Representatives of several other states, however, reported that such resurfacing has been done by contract, reporting plenty of contractors.

▼

## Duffy Joins Foundation Staff

E. E. (Earle) Duffy has joined the staff of the Automotive Safety Foundation, Washington, D. C., according to an announcement by Pyke Johnson, president of the Foundation.

For the last 15 months, Mr. Duffy was director of public relations for the American Road Builders' Association, and for two and a half years previously was planning secretary of the Wayne County Road Commission, Detroit.

Prior to his Wayne County position, Mr. Duffy was for many years with the Portland Cement Association, Chicago, engaged in public relations activities in highway and safety fields.

▼

## Early Start Expected on Washington Highway

The Washington State Highway Department has been granted approval by the War Production Board that will permit construction of a 10.8-mi. four-lane highway on the Pacific route between the town of Woodland and Kalama River to the north.

Permission to construct the project, which is slated to cost about $2,500,000, had been rejected by the WPB on three prior occasions.

State Highway Director Burwell Bantz is seeking early approval of plans by the Public Roads Administration in order that bids can be called for.

Rights-of-way have already been purchased and $2,636,000 set aside for the job. Of this amount $1,350,000 is federal funds.

Highway officials estimate the job, including the paving of two of the four lanes, will be finished in about nine months.

(Left): H. A. Dick, Nominee for President of A.G.C. for 1945. (Right): William Muirhead, President of A.G.C. 1944

At the Tuesday Luncheon: Left to Right: H. B. Zachry, Past President; H. E. Foreman, Managing Director; D. W. Winkleman, Chairman, Highway Division

# AGC Meeting Notes

## Governing and Advisory Boards of Associated General Contractors Consider Post-War Problems at Fall Session

NO one attending the meeting of the Associated General Contractors' Governing and Advsory Board in Chicago, Nov. 28-29, could fail to be impressed with the practical idealism of the organization and its chosen representatives. Throughout both general and group sessions problems were discussed without either belittling them on the one hand or becoming panicky on the other. The necessity for recognizing conflicting interests (particularly in the field of labor relations) was admitted. Means of securing favorable, and preventing unfavorable, legislation were considered at length. The keynote of the meeting was the improvement and strengthening of the contractor's position in the business world.

### Dick for President—Bellows for Vice President

At the Wednesday morning session candidates were nominated for president and vice president of the association for 1945—for president, H. A. Dick, president of the Gilpin Construction Co., Portland, Ore., and for vice president, Warren S. Bellows, president of the W. S. Bellows Construction Co., Houston, Tex. New officers of the Association will be elected at the annual meeting next spring.

Mr. Dick, at present vice president of the Association, is a member of the Portland Chapter of the A.G.C. He has served as a member of the Advisory Board of the National Association, and headed the Heavy Construction and Railroad Contractors' Division since 1939. He has been associated with the Gilpin Construction Co. in Portland since its organization in 1919, became treasurer of the company in 1922, vice president in 1932, and was made president in 1936.

Mr. Bellows is a native of Kansas City, Mo., and a graduate from the University of Kansas. After much experience in various types of construction work, he organized his own company in 1915, and has been actively engaged in general construction since that date.

### Program

Aside from routine matters, subjects discussed at the general sessions were as given below.

Legislation

Construction Market

- (a) War Production Board Developments
- (b) Postwar Planning—Report of Market Development Committee
- (c) Accelerated Depreciation of Structures
- (d) Staff Memorandum on Postwar Planning Activities

Public Relations

- (a) Progress Report
- (b) Program for 1945

Surplus War Property

Renegotiation of Contracts

Labor Relations

Revised M.P.R. No. 251

Federal Taxes

The special sessions were—

- (a) Highway Division
- (b) Heavy and Railway Division
- (c) Building Division

Main subjects at the Highway Session were—

(1) The Highway Program and Postwar Highway Legislation

(2) Airport Construction—Present and Postwar Prospects

(3) Other Items

- (a) Sale of Surplus Construction Equipment
- (b) Accident Prevention Contests
- (c) Use of A.G.C. Seal
- (d) Labor Relations
- (e) Miscellaneous

### The Managing Director Stresses Vital Issues

The printed report of Managing Director, H. E. Foreman, is packed with pertinent comment. A few excerpts follow:

In the uncertain future three facts face American business.

First is that unless there is, or there appears certain to be, a high level of peacetime employment in the next four years or so, the continuation of our present form of economy is doubtful.

Second is that there will be continuing regulation of business by government after the war.

Third is that many people in the country have greater confidence in the national ability to win the war than to solve the employment problems of the peace; they maintain a wait-to-be-shown attitude that private enterprise can flourish after the transition to peace times.

The task before leaders of American industry and all of the elements composing private enterprise, is to plan courageously and execute the plans intelligently so that there will

(*Continued on page 77*)

# GET SAFETY *first*... *Skidproof* ICY ROADS WITH CALCIUM CHLORIDE TREATED ABRASIVES

THE first hours after ice forms on roads are the hours when the most serious losses of life and property occur. In a few hours, drivers learn to adjust their driving to meet highway conditions, no matter how bad.

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Even in cases where complete ice-removal may later be desirable, the quickest and best protection to traffic in the early critically dangerous hours is a speedy skidproofing application of abrasives treated with calcium chloride.

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## More on Surplus Property Disposal

The Treasury's Office of Surplus Property has announced a new policy to facilitate disposal of surplus property and furnish more complete information on things to sell.

At intervals the department will issue the "Surplus Reporter" listing commodities for sale for all regions. It will advise firms on Treasury's mailing list what the Treasury has to sell, the area in which material is located and the general method to be used to sell it. It no longer will be necessary for persons to contact each of the eleven regions.

The "Surplus Reporter" will be issued in eight editions covering: Hardware, General Products, Furniture, Machinery, Automotive, Textiles and Wearing Apparel, Medical and Surgical, Paper and Office Supplies.

Purchasers will contact the regional office and indicate the items in which they are interested. If disposition is to be made by invitation to bid, forms will be sent. If sale will be made by fixed price, negotiations or otherwise the prospective purchaser will be so advised.

OSP's Washington Office will hereafter act as a policy, pricing and directorial staff. Sales will be made from Regional Offices in each of which there are eight commodity departments similar to those in Washington. In charge of each of these Regional Departments will be a marketing specialist, who is a seasoned business man, familiar with trade practices in his particular field.

Treasury's eleven Regional Offices of Surplus Property are:

REGION I—New England; Park Square Bldg., Boston, Mass.
REGION II—N. Y., Penn., N. J.; Empire State Bldg., 61st Floor, New York, N. Y.
REGION III—D. C., Del., Md., N. C., Va.; 1126 21st Street, N. W., Washington, D. C.
REGION IV—Ohio, Ind., Ky., W. Va.; Commercial Arts Bldg., 704 Race St., Cincinnati, Ohio.
REGION V—Ill., Mich., Minn., N. Dak., S. Dak., Wisc.; 209 La Salle St., Chicago, Illinois.
REGION VI—Ala., Fla., Ga., Miss., S. C., Tenn.; Belle Isle Bldg., Atlanta, Ga.
REGION VII—Ark., La., Okla., Texas; 609 Neil P. Anderson Bldg., Fort Worth, Texas.
REGION VIII—Iowa, Kan., Mo., Neb.; 2605 Walnut Street, Kansas City, Mo.
REGION IX—New Mex., Colo., Utah, Wyo.; 7th Floor, Exchange Bldg., 1030 15th St., Denver, Colo.
REGION X—Ariz., Calif., Nev.; 30 Van Ness Avenue, San Francisco, Calif.
REGION XI—Idaho, Ore., Mont., Wash.; 2003 Fifth Avenue, Seattle, Wash.

▼

**Structural Steel Bookings Show Increase**—October bookings of fabricated structural steel for bridge and building construction reported to the American Institute of Steel Construction totaled 77,608 tons. This figure compares with 49,999 tons for September, and 59,282 tons for October of last year.

# A.G.C. Meeting Notes

(*Continued from page 74*)

be a high level of business activity and employment after the war, and the people will have confidence in our way of life.

* * *

The future requires that general contractors secure a large volume of work to perform, and conduct their affairs so that they merit and secure the confidence of the people in their way of doing business.

* * *

## Relaxation of Construction Regulations

The relaxation of federal regulations is the first factor essential to increased construction activity. The A.G.C. has been working with government officials to that end.

Fore more than a year representatives of the A.G.C. have been working as part of the Construction Industry Advisory Group, organized through the Chamber of Commerce of the United States, on the relaxation of construction regulations. Committee representatives and government officials have met on the problem daily.

A.G.C. President William Muirhead has been active in work of this group, which is headed by Past President E. P. Palmer.

On Sept. 26 members of the group conferred with J. A. Krug, Chairman, War Production Board, and other WPB officials. The committee stressed the importance of taking steps now to assure the later rapid resumption of civilian construction work, and making provision for the manufacture of materials and equipment.

WPB officials made it clear that it is their intent to remove civilian construction controls after the collapse of Germany, and that every feasible step would be taken. A Construction Bureau was established under the Vice Chairman for Operations. Minor relaxations of the L-41 order have been made.

Proposals for the revision of government regulations of all industry after V-E day have been drafted by a special Task Committee and announced by Chairman Krug. The committee's report concluded that there should be no spoon feeding of the economy, stating:

"No action should be taken that might hamper private enterprise or ingenuity, either by restricting members of an industry to historical patterns of business or by preventing entry of newcomers. Except for military requirements, which must be protected at any cost until victory over Japan is secured, it is expected that essential needs will be met, by and large, without government control, either restrictive or supporting."

Although many wartime controls will be revoked or adjusted, it cannot be expected that all controls will be removed at the end of the war, or that the trend throughout government in the past dozen years to increase regulation of business will be completely reversed.

* * *

## Labor Relations

Present conditions indicate that the War Labor Board will function, as now constituted, at least until Germany is defeated. If this does happen, the Wage Adjustment Board probably will continue at least until that time.

* * *

The developments in wage stabilization continue in the direction of greater enforcement of compliance in practically all parts of the country. Inasmuch as the enforcement and the determination of the sanctions to be levied for non-compliance are functions of the Regional War Labor Boards rather than the Wage Adjustment Board, it is highly important that branches and chapters continue their efforts to have persons familiar with the operations of construction serve on advisory panels if not directly on regional boards, so that the practices of construction may be well understood by the panels dealing with enforcement.

* * *

## Disposal of Surplus War Property

The manner of disposal of surplus war property is of vital interest to the construction industry and the national economy.

The meeting of the A.G.C. Governing and Advisory Boards in Chicago May 30, 1944, adopted a resolution recommending that in the disposal of surplus construction equipment the following principles be followed: that dumping be avoided; that equipment be appraised before being offered for sale; that none be distributed on a gratis basis; that no priority or preferential price be offered to state or local governments; that equipment be offered for sale through recognized dealers and distributors.

In October the Surplus Property Act was approved. Its principles were similar to those recommended by the A.G.C., except that state and local governments were among those having the opportunity to make purchases before commercial purchasers, although they received no price concessions.

The act has not yet gone into operation because members of the board which it created have not been appointed. There is the possibility that the act may be amended before becoming effective. Proposed amendments would bring it closer to A.G.C. recommendations.

During consideration of the act, the association presented A.G.C. recommendations to Congress. It has appointed a special committee to study the disposal of construction equipment. Information available to the association is that to date sales of construction equipment have been through dealers at fair prices.

* * *

## Taxation

For several months the Congressional committees responsible have been studying proposed tax revisions. The studies will continue this year, but the serious work of drafting a new tax bill will not get under way until early in 1945.

Statements made so far by members of Congress indicate that no changes in individual taxes are to be expected before 1946 incomes. It is not safe to assume that there will be a reduction or repeal of excess profits or other business taxes before that year.

* * *

The association has sent a request to the chapters and branches for suggestions on what the A.G.C. should present to one of the committees of Congress which has requested recommendations from the association on the following points: how should an estimated federal postwar budget of $20,000,000,000 be raised; what taxes are most burdensome; what reductions should be made; how should relief provisions and regulations be clarified; and what can be done in the realm of postwar taxes so that each group pays its fair share of taxes and no more.

* * *

## Public Relations

In building for national prosperity, the amount of work to be done by general contractors will depend greatly upon the confidence which others have in them.

As an aid to its membership in securing and maintaining the confidence and good will of others, the national association has undertaken a public relations program. The Executive Committee has voted to recommend that the Governing and Advisory Boards approve an expanded program for 1945.

# Minneapolis Paves 195 Blocks of Alleys

## One ready-mix and one 27-E paver crew were kept busy during the 1944 season; quality concrete methods adhered to with minimum labor

By F. T. PAUL
City Engineer, Minneapolis, Minn.

THE use of air entraining cement, the modern equipment and methods employed by the municipal crews, and the extent of the program, combined to lend special interest to the 1944 alley program at Minneapolis. The city in an ordinary year had previously paved as high as 85 blocks of alleys on petition of property owners. This year by full use of labor-saving equipment on hand, wood forms and other war makeshifts, the city's limited street crews were able to complete 195 blocks, or about 22 miles, setting something of a record. Some 25 alley blocks petitioned are being carried over into the 1945 season.

One of many clean, attractive residential alleys recently built in outlying Minneapolis

### Two Types of Crews

Two crews were organized to do the paving, one employing ready-mixed concrete batched at the city's plant and delivered by city-owned truck mixers. This outfit put in a full working season. Truck mixers, while rated at 4 cu. yd., were kept to 90-cu.-ft. (3⅓-cu.yd.) batched to accommodate the soft subgrade and conserve equipment. One round trip per hour was used as the basis of paving with the ready-mix trucks on about a 6-mile haul.

The second crew, built around a 27-E paver, got under way late in the summer, on outlying alleys. Batch trucks were supplied from sand and coarse aggregate stockpiled in the street at points central to a number of sections of alley. The materials were volumetrically proportioned into the trucks by means of a mechanical loader, one for sand and one for gravel. The batch trucks stopped at one loader, then the other, then took on cement by pulling alongside a trailer on which sacks were stored in a high-ceilinged body closed on one side and open on the loading side except for tarpaulin cover.

The construction methods used in both cases were about the same. Less cleaning up time and moving time from one alley to another was incurred when using batch trucks, since on the completion of each alley the mix trucks towed equipment and tool boxes to next job and the crew was ready to start laying concrete immediately with no loss of time.

This has been a great advantage over the use of the paver, which moves slower and sometimes required loading of equipment on trailers with resultant loss of time.

The ready-mix trucks hauling 3⅓ cu. yds. of concrete, however, do displace the forms and subgrade more readily than the smaller trucks hauling dry batches to the mixer, requiring more adjustment of the subgrade. This was especially true when wet subgrade conditions were encountered.

Alleys are graded with a ⅜-yd. shovel and necessary trucks.

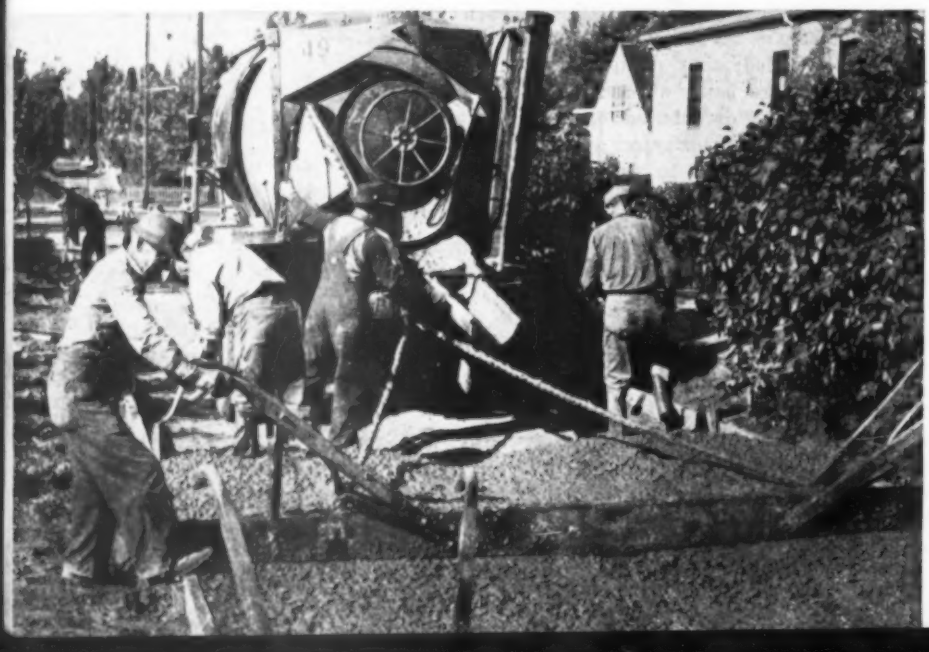
Concrete made with air entraining cement was spread and finished as follows:

1. After concrete was deposited between the forms it was struck off by means of a heavy screed, held steady by a man at each end while it was drawn forward by the mix truck or paver. This screed roughly formed the reverse crown and centerline gutter. Two men helped spread concrete with shovels and rakes.

2. A two-handled 10-ft. longitudinal float, operated from bridges by the two shovelers, was seesawed or dragged across from one form to the other immediately behind the strike-off.

3. Surface was then gone over sparingly with light, long-handled floats.

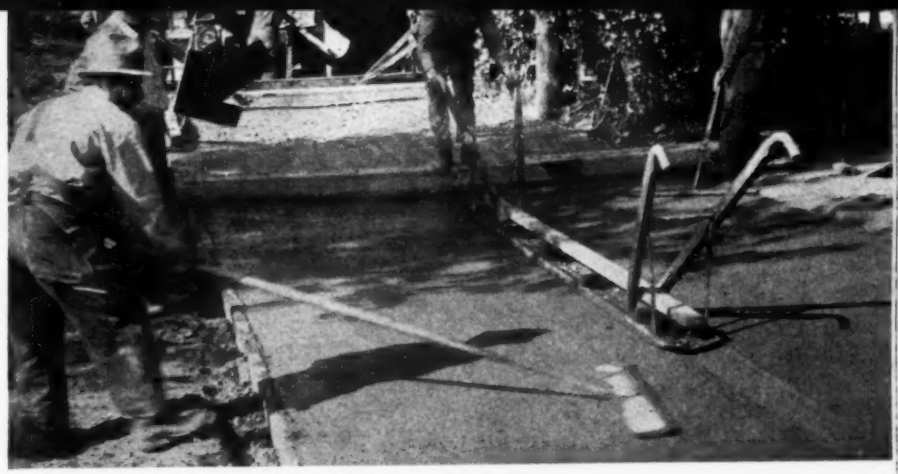
Concrete was struck off initially by towing a heavy screed behind the mix trucks or paver while a man at either end of the screed steadied it. This strike-off roughly formed the small trough specified along the centerline

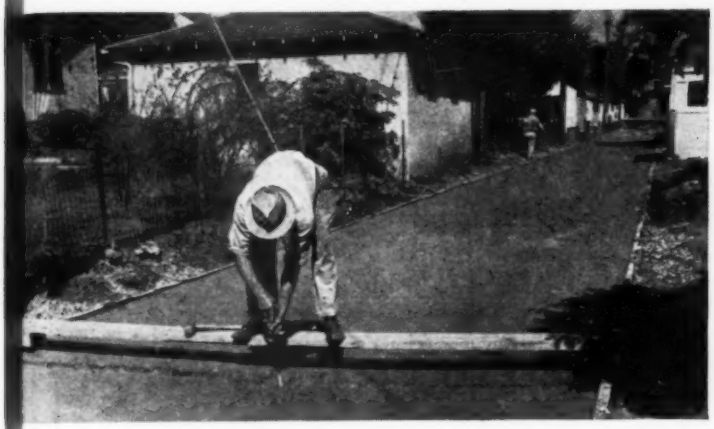


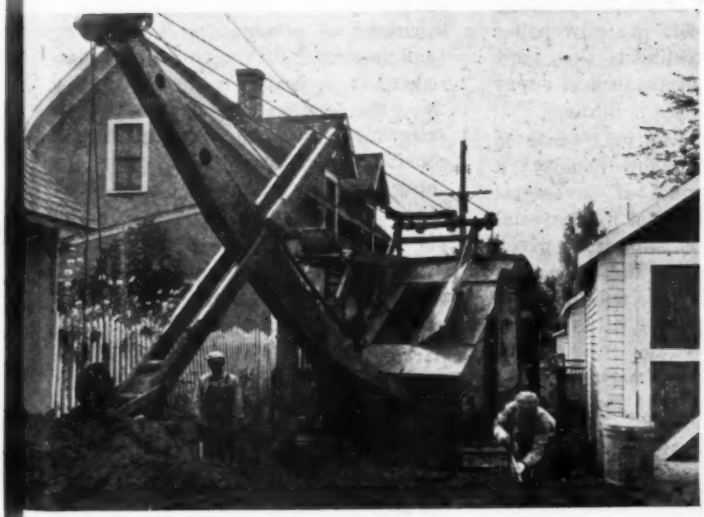
(Right): A two-handled 10-ft. longitudinal float, operated from bridges was seesawed or dragged across from one side to the other immediately behind the strike-off (shown to rear of nearest bridge, see arrow). The surface was then smoothed with light, long-handled floats used sparingly, and the center gutter given its final contour by dragging a heavy float as shown in foreground

(Right below): Concrete was sprayed with liquid curing compound, thus thoroughly taking care of a detail sometimes neglected in concrete alley construction in the past

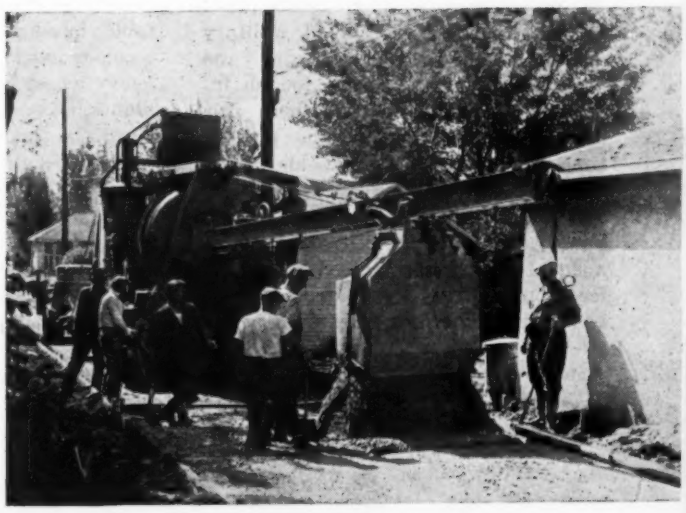
(Below): Dummy joint shield plates with premoulded strips were forced into the finished concrete. After concrete had stiffened up, plates were lifted out with a steel hook, as in road work. This was followed by edging







In contrast with WPA days alley grading was speedily and economically handled by a ⅜-yd. shovel assisted by two hand shovelers for clean-up work. Wood forms were used



One of the two Minneapolis alley crews used a 27-E paver, which was just able to squeeze along between the forms

4. The center gutter was given its final contour by dragging forward a heavy plow-handled float whose contact surface was rounded to form the gutter-way.

5. The surface was broomed and joints and edges rounded to the usual manner, four men working on brooming and hand floating.

6. Membrane curing materials were applied with a simple pressure cylinder.

Each crew usually required 20 laborers, including 2 formsetters, 3 finishers, 2 helpers, 2 men on trucks moving forms ahead.

Most alleys paved in 1944 were in residential areas. Pavement depth is 6 in. uniform; width, usually 12 ft. on a 14-ft. right-of-way. A 3-in. reverse crown was specified. Expansion joints were spaced 45 ft. with dummy joints every 15 ft. A 6-sack, 5½-gal. mix was employed. Late this past fall 2 lb. of calcium chloride per sack of cement was added when air temperature fell below 45 degrees.

## Each Project Gets Pin on Wall Map

Alley paving in Minneapolis is built by the city on petition, under a 5-year assessment plan. Each alley is undertaken as a separate paving project, one block in length.

The alleys when paved are located on a large map of the city with colored pins and the program and progress are outlined so as to save all unnecessary moving and gain the advantage of both methods of construction used.

(Left): Concrete aggregates for paver batches were stockpiled at points central to several blocks of alley work whenever possible. Two crawler-mounted loaders, one each on stone and sand, filled batch trucks using volumetric measurement. (Right): Sacked cement was added to the batches from covered trailers spotted near the aggregate loaders

The city carries some of the cost in blocks where extra alley area must be paved due to triangular or other irregular shape of the block. No initiative has been taken by the city to stimulate alley improvement. The large demand for alley paving this past year came as a result of a particularly bad winter and spring break-up, and was also believed to be influenced by the fact that more residents than usual had the ready cash.

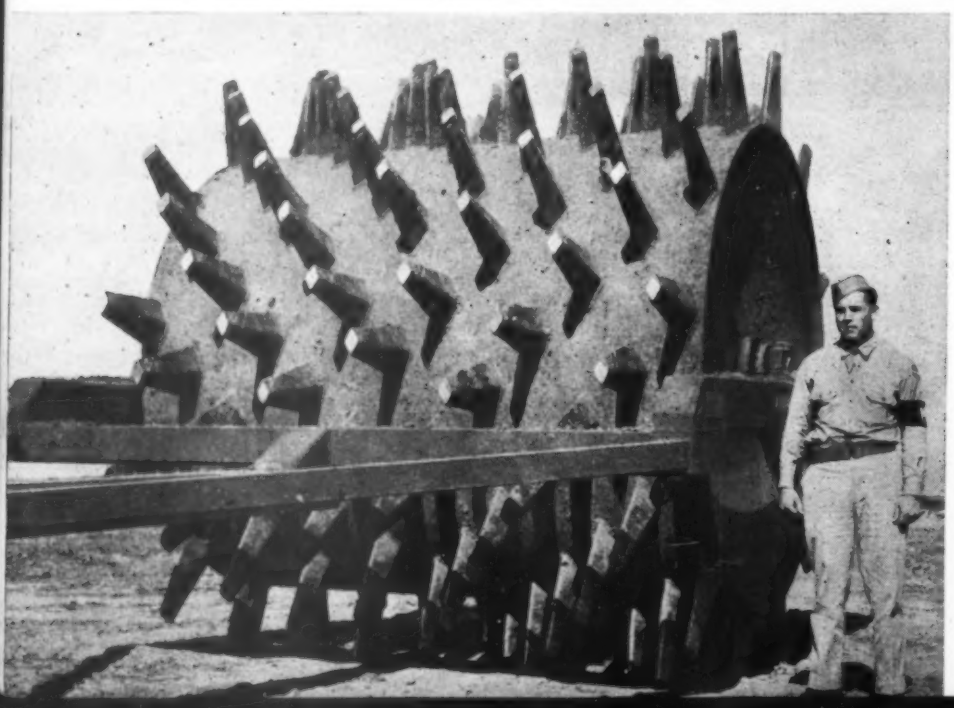
The foregoing program was under the direction of F. T. Paul, city engineer of Minneapolis, with Eph Campbell, Jr., acting paving engineer and Gordon E. Bodien, engineer of tests.

# Giant Rollers for Heavy-Duty Runways

IT is no violation of the rules of military secrecy to state that the size and weight of military aircraft has grown by leaps and bounds and one would be foolish indeed who would predict where this growth would stop. At the present time we have many airfields which were constructed two or three years ago for what were then "heavy bombardment planes" which are now inadequate for giant planes now in service. Some of the newer airports were constructed for airplanes that were, at that time, merely in existence in the designer's mind or on the drafting table, but many fields are now being reconstructed to support the very heavy wheel loads of these new super planes.

Where soil in its natural state is uncompacted (i.e., at low density) a greater total thickness of pavement, base course and imported fill material is required to safely support a given wheel load than where the same natural soil is compacted to a high density. That being the case, it is apparent that an increase in density of the sub-grade will permit a reduction in thickness of pavement or base course (and imported fill) with an attendant reduction in cost. To be really effective, the increase in density of the subgrade must be accomplished to considerable depth. The compacted sub-grade, in effect, becomes a replacement for a portion of the imported fill.

Note narrow diamond-shaped 18-in.-high feet, designed to walk out of deep material



## Advantage of Deep Subgrade Compaction

To illustrate the advantage of compacting the subgrade material to considerable depth, the following example is cited. It is desired to construct a runway for the heaviest planes now in service at a field where the natural soil forming the subgrade is a plastic clay or adobe having a California Bearing Ratio (CBR) of 3%. The required total thickness of pavement and base course on this material in its natural state is 46 in. This total pavement structure would consist of 4 in. of asphaltic concrete on 5 in. of crushed rock or well graded gravel base course having a minimum CBR of 80%. The remaining 36 in. would be an imported fill having a CBR of not less than 35%.

If the subgrade (natural soil) can be so compacted that its CBR is increased from 3% to 8% to a depth of 21 in., the total thickness of pavement, base, and imported fill required for the same wheel load would be 25 in., a saving of 21 in. of imported fill.

Compaction of 21-in. layer of subgrade in place is possible with this 58,000-77,000 lb. roller

With compaction equipment customarily used on road and airport work, a 6-in. thick layer of material is about the maximum that can be compacted at one time. With this equipment the compaction of 21 in. of sub-grade could only be accomplished in 4 lifts and would require excavation of three-fourths of the material which would be stock-piled thus permitting the compaction of the lowest one-fourth thickness in place. The stock-piled material would then be replaced in layers and compaction rolled one layer at a time. This procedure may or may not, result in a saving in cost depending on the distance the 35% CBR imported fill must be hauled.

## Compacts 21 In. in One Operation

A second method of achieving the same objective developed by the Sacramento District, Corps of Engineers, U. S. Army is to compact the entire 21-in.-thick layer of subgrade in place in one operation. To do this requires a "sheepsfoot" roller with feet not less than 18 in. in length out from the drum. In order that feet of that length would penetrate and tamp the earth the unit load on each foot must be high. To this end, the Sacramento District of the Corps of Engineers, U. S. Army, had constructed a giant sheepsfoot roller.

The roller, as originally built, has a steel drum 8 ft. in diameter, 10 ft. in length. To the surface of the drum 48 steel feet were welded. These feet were 18 in. long with "diamond" shaped pads 2½ by 5 in. for contact surfaces. The draw-bar was attached to a rectangular box-girder frame around the roller, this frame being suspended from the axle of the drum. As originally constructed, the entire roller weighed 26,600 lbs. With the drum filled with water, weight was increased to 58,000 lbs. Filled with wet sand in place of water the gross weight was 77,000 lbs.

The first tests with this roller indicated that 48 feet were insufficient to accomplish satisfactory compaction so additional feet were added which brought the total number of 84 and later to 156 feet. With this number of teeth the trips necessary to produce the required compaction were reduced to a reasonable number and the roller, due to progressive compaction, would eventually "climb out" until the feet penetrated to a depth of about 6 in. Compaction of this final upper 6-in. layer is accomplished by use of standard sheepsfoot rollers and a heavy rubber tired roller for the top surface.

## Special Pneumatic Roller

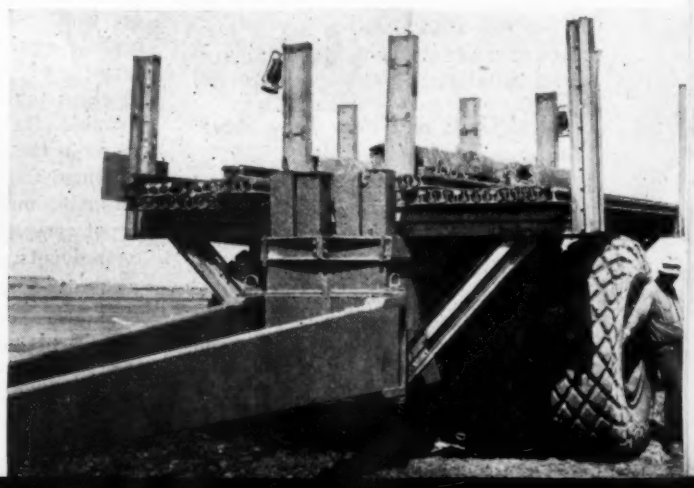
The heavy rubber tired roller consists of steel boxes bolted together with an axle protruding from the side of each box. A dual wheel is mounted on each axle carrying two 24 in. x 32 in., 36-ply pneumatic tires.

The boxes are equipped with a common "A" frame which serves as a drawbar with a universal hitch to which a tractor can be attached. The steel boxes are filled with scrap steel billets to obtain additional weight. On occasion, the roller has been ballasted with railroad rails so that the maximum gross load has been as high as 170,000 lbs.

The pneumatic roller is also used as a test rig to obtain data on the performance of runway pavements under load. The two boxes mentioned above are then separated by a third box which sets in between the others like the cross bar of the letter "H." This increases the tread to a distance com-

(*Continued on page* 84)

Details of special pneumatic roller which was ballasted to a maximum gross load of 170,000 lb.



# Engineer Operations in the European Theater

*Editor's Note: This article, based on informal remarks of Major General C. R. Moore, chief engineer, European Theater, serves as a timely supplement to the report, "Engineers' Part in the European Invasion." See "Roads and Streets," October, 1944*

## I—Mission of the Engineer Service

BROADLY speaking, the mission of the Engineer Service in the European theater is to furnish the armies with maps and terrain intelligence for operational planning and, when the operations have started, accept the responsibility for keeping the armies on the move and the supply lines open. The Engineer Service prepares and disseminates more intelligence data than any other agency in the theater, because our needs for information are so extensive. By the time we have all the facts necessary for our operations we find that we have also accumulated most of the information that is needed by other staffs and services.

At this writing (October, 1944) we have in the European theater about 50 different kinds of Engineer Troop Units serving in every component of the Army Air Forces, the Field Forces, and the Service Forces in the Communication Zone. Virtually all of our work is done to serve some other arm of service in the fulfillment of its mission.

### Typical Units and How They Serve

Engineers with the Air Forces build, maintain and defend airfields, furnish fire protection and reproduce maps and charts for all installations. In the Ninth Air Forces, the Engineer Command is one of the largest components and operates as a unit in the same way as Bomber Command, Fighter Command, and Air Service Command.

In the Field Forces, each infantry and armored division has a combat engineer battalion which is used either as a single unit or is split up so as to attach one Company to each Regional Combat team. During the assault on the beaches an extra Engineer Combat Battalion was assigned to each assault division area. Divisional Combat Engineers do bridging, mine removal and essential road maintenance, water supply plus forward demolitions and special assault work on enemy fortifications as needed.

Behind the Divisions in each Corps is one or more Engineer Groups consisting of a Headquarters controlling four Engineer Combat Battalions, one or more Engineer Dump Truck Companies, a Topographic Company and any other special units that may be attached from time to time in accordance with the mission of the Corps.

In the Army area are found more Combat Battalions, plus Engineer General Service Regiments with heavier equipment and more trained specialists equipped to do a variety of large and complex engineer work. Each army has an Engineer Topographic Battalion to print special maps in the field, a water supply battalion, a Camouflage Battalion in addition to maintenance companies and depot companies to operate the Engineer depots.

### In Communications Zone

Engineers in the Communications Zone will include large numbers of General Service Regiments, Port Construction and Repair Groups, Port Repair Ship Crews, Dredge Ship Crews, a Base Topographical Battalion, more shop and depot companies, Pipeline Companies, Gas Generating companies, a Model Making Detachment, Firefighting Platoons and many other special troops.

We are responsible for all construction in the theater of operations except signal construction. This includes airfields, camps, railroads, roads, bridges, pipelines, ports, inland waterways and utilities. All of those projects except railways are maintained by Engineer troops. Maps, beach and terrain intelligence, the study of natural resources, camouflage, water supply, bulk supply of petroleum products, materials of construction, real estate, and firefighting are other jobs that we must contend with.

### Comparison of Engineer Mission, This War and Last

The percentage of engineers to the total force in this war is just about the same as during the last, but the amount of work to be done has increased almost astronomically. In 1914-18 there was no port work of rehabilitation to be done, no operation of open beaches, no mines to be lifted, very few booby traps, and hardly any airfields to be built. Contrast that with the fighting potentials of today and we find that, although the size of an Infantry Division is considerably smaller, it now has more than twice the firepower and more than three times as many vehicles per hundred men as did those in the previous war. The burden of providing adequate road, rail and port facilities is emphasized by present requirement in excess of a thousand tons per day to

supply each front-line division and supporting troops.

All the gasoline consumed by General Pershing's AEF during the entire campaign would scarcely be considered more than a fair operational reserve for our armies in the field and our air forces.

We have made substantial progress in our Engineer capabilities by the use of mechanical equipment. For example, our large bulldozers can move more earth than several hundred men and one 8-cu. yd. scraper can match 500 men with picks and shovels. The portable steel airfield landing mat enables us to put down a good forward airfield in two or three days if the grading is not excessive. A half a dozen men with our motorized air compressor set can do as much as a whole company of men could do with hand tools.

### Functional Tasks Merge; Early Reconnaissance Important

A characteristic of our operations in this war is the almost complete absence of sharp demarkations between the work of the Division, Corps, and army troops and those of the Communications Zone. I am a great believer in early reconnaissance since a day saved in reconnaissance is always a day saved in getting the final job done. That's why we try to know what we are going to do as soon as the army captures the ground. At the present time our men are carrying on reconnaissance practically in the front lines and beyond, for railroads, pipelines and other construction activities of Communications Zone troops.

We are making extensive use of airplanes for this work. I have personally made low-level reconnaissance of almost all the railroad mileage we are now developing. By flying in a moderately slow plane at 50 to 100 ft. it is possible to see the exact condition of a right-of-way—the amount of damage and the bridges that need repair and rebuilding. Then we can lay out the job accurately and send the proper number of men and the right amount of equipment so that the job can be completed on schedule.

The military pipeline is another new development in our communications enabling us to deliver bulk gasoline to forward areas without cluttering the roads with tank trucks. We estimate that each pipe line put in has the effect of removing 400 trucks a day from the roads, thus clearing the way for other cargo needed up front. The pipeline itself is quite economical of tonnage, even when it is being built, requiring only 30 tons per mile for our 6-in. line and 16 tons per mile for the 4-in. The erection crews have done more than fifty miles in a single day.

### Never Enough Troops

The volume of actual engineer work to be done in the present operation is such that there are not enough engineer troops to do all the jobs that might be given to them. For example, all of the assault divisions that spearheaded the U. S. invasion, were given what almost amounted to basic engineer training in explosives, demolitions, the use of flame throwers, bangalore torpedoes, and wire-cutters at the Assault Training Center under the direction of Col. Paul Thompson, an engineer officer specially qualified by his knowledge of enemy fortifications and assault doctrine. The land mine warfare, both anti-tank and anti-personnel has reached such a stage of development that it is entirely beyond the capabilities of our limited number of engineer troops to detect and remove all the mines encountered. As a result it has been necessary to give the infantrymen and the men of other services, training in the use of mine detectors and methods of de-mining.

## 2 — Rail Rebuilding Astonished Germans

The excellent work of the RAF and the U. S. Army Air Forces in destroying German-held railyards, bridges and rolling stock created most of our railroad work for us, but we had planned on the destruction achieved and were ready. Several Engineer General Service Regiments were specially trained and equipped in railway construction and bridging. Their performance is almost unbelievable and it must have been a great surprise to the Germans to see our American locomotives and cars practically at the front lines despite all the damage done by our air forces and German demolitions.

Perhaps the most dramatic achievement came Aug. 13-15—a story that now can be told. If you will recall, the break-through had occurred, and our troops were pouring through the Avranchos-Coutances funnel into the interior of France towards Paris. The rapidity of the thrust had disorganized the Germans and our most pressing problem was supply of our fast-moving spearhead troops. Railways were essential—but we, with our air force, had so completely destroyed the railways, bridges, yards, and facilities that the Germans, as early as D-Day, had given up as impossible the repair of those vital lines.

On the morning of Aug. 13 two General Service Regiments, with attached dump truck companies, began on railroads. That same morning we were asked by General Patton to have this railroad leading into Lemans and Laval operating in 48 hours.

The job meant rebuilding 7 bridges in various stages of demolition; repairing and laying totally new main lines in three railway yards; laying many miles of new rail approaching the yards and bridges within the target area; and provision of facilities, such as watering points for locomotives.

### Not Months but 48 Hrs.

It was a monumental job if spread over months. In 48 hours, it seemed almost impossible. Three additional regiments were rushed into the area; all the heavy equipment that could possibly be spared from other equally pressing jobs was moved to the bridge and yard sites; by day and by night, the highways leading from Cherbourg and the beaches were jammed with trucks immediately dispatched for essential material and equipment. Even while the bulldozers were clearing the debris and troops were moving onto the job, engineer officers, in hastily thrown up drafting tents, were designing new bridges.

As the deadline approached, front line supply trains moved into Avranches. And by midnight, Aug. 15, they passed Ste. Hilaire du Harcourt, across the last bridge and on to Lemans and Laval and Patton's fighting men.

## 3—European Port Problems

As you all know, the key to the success of the invasion has been our ability to move unprecedented tonnages of equipment and cargo over the open beaches. Despite their experience on the receiving end of our beach operations in Africa, Sicily, and in Italy, the Germans greatly underestimated our capabilities. It seems quite apparent at this time that their whole defense plan was predicated upon the denial of the ports to the Allied forces. Thus, the ability of our Engineer Special Brigades, working with the Transportation Corps and the Navy, to move great tonnages over American-held beaches, completely upset their calculations.

The only important consideration is, "How much deep-water berthing facilities does the captured port have?" In other words, how many Liberty ships can be anchored alongside the docks and unloaded directly on trucks or railroad cars for movement to the front? That is the only important advantage a port can offer over a beach.

Thus, it can be seen that we still

have a major problem of developing and rebuilding port facilities adequate to support the great forces massed here in this theater. It has meant that every facility had to be repaired and brought up to completion as fast as possible because, in the aggregate, the tonnages from all our little ports and our beaches had to add up to the needs of the armies in the field.

Another limiting factor in our utilization of the ports in our hands is their distances from the fronts. Each advance by the armies means longer road and rail communications. So we have the additional problem of finding roads and rail lines we can rebuild and maintain for the Transportation Corps to use in supplying our armies.

Road maintenance of the Red Ball Highway and other supply roads has required the services of five regiments or a total of 6,000 men. Although that is a heavy commitment, it will become more of a job as we get into winter. Road maintenance class to the front, or in areas of heavy fighting, creates more problems.

## 4—Planning Engineer Supply

Perhaps Engineer Supply for an operation is tied more closely to the ground to be covered than that of any other service. Aside from the standard organizational equipment of each Engineer Battalion and Regiment, the type and quantities of bridging, railroad and port repair equipment and materials must vary with the terrain. If the country has wide rivers, one type of bridging is needed, if the streams are narrow with high banks another might be needed.

Intensive studies have been made of the supply work in Italy and North Africa. The experience there was of great help to us in our planning for this operation. When every ton of shipping is important it is vital that we have the right kind of materials and equipment at the right places to do the job. In that respect our advance planning was in such detail that there has been no serious shortage of any items needed to accomplish our mission.

The railway bridging selected for the European theater was ordered over two years ago—before the exact point of attack was known. For that purpose our engineer planners had to assume an operational area in Northwestern Europe and then make detailed studies. They found that about 30 ft. of railway bridging would be needed for each mile of railroad. When the actual assault area was known, a recheck showed that this figure was high; railway practice varies so much from one country to another that even the tools required here are different from those we use in the U. S. Switches, cross-overs, and erection equipment were procured for the exact conditions in France.

Utilities, power and water supply are studied thoroughly to determine what materials must be on hand to repair damaged and destroyed equipment. Transformers, insulators, connectors, motors, generators and the thousands of smaller items must fit the voltage and the distribution systems we encounter.

### Equipment Parts and Maintenance

Another sizable part of our engineer supply problem is the maintenance of our heavy equipment and the supply of spare parts. Although not as large a problem as that of the Ordnance Department, our engineer equipment requires the storage and issue of more than 100,000 spare parts. These *must* be on hand when and where needed.

We solve the maintenance problem in two ways—each regiment has a shop truck that can undertake most of the maintenance required. This includes welding, machining of parts, grinding, cutting, sharpening, threading, and other light machine operations. When heavier maintenance is necessary, it must be sent to the Heavy Shop Company which is equipped to repair and rebuild the largest and heaviest equipment, such as 22-ton bulldozers, large crushers or 34-E pavers.

## 5—Cooperation with the French

We have received most enthusiastic cooperation from our French allies, and are grateful for their important assistance. French technicians have been especially helpful in our railroad work and the restoration of utilities. It is our policy to assist the French people in every way that we can within the means available. In other words, we have not just limited our work to the barest minimum for our needs but have tried to assist them in restoring the civilian economy.

An example is the power supply in Paris which is now three times as great as it was when we came. We are also helping rebuild the power line between Cherbourg and Avranches. Naturally, the French have been short of some tools and equipment—especially trucks and mobile field construction equipment. We have loaned them our earth augers for digging post holes as well as dump trucks and some heavy equipment. We appreciate their problems and they understand the limitations imposed on us by military operations. At the present time many of our installations are being guarded by French troops thus releasing our specially trained technicians to do the type of work they can do best. This splendid spirit of cooperation on both sides has been a valuable contribution to our Allied war efforts.

▼

**Traffic Signs in Moscow**—Traffic signs in Moscow are somewhat different from the ones in the United States. For instance, a sign with the letter "P" means no parking. A sign bearing the picture of a horses' heads indicates that no horses are allowed on that street. The picture of a bicycle means no bicycles are permitted on the street.

▼

**Pennsylvania to Remove Advertising Signs**—The Secretary of Highways of the State of Pennsylvania has notified his Division and District Engineers that advertising signs within the limits of 22 scenic areas are to be removed as soon as possible within legal limits. The action is taken under authority created by several acts of the state legislature.

▼

## Giant Rollers for Heavy-Duty Runways

(*Continued from page* 81)

parable to the tread of the largest bombing planes.

Although these two giant rollers have been in service but a short time, test results so far taken show the usefulness of this equipment. On the first job where the big sheepsfoot roller was used, the following construction test results were obtained:

| Depth | Relative Compaction—Before Rolling | After Rolling |
|---|---|---|
| 18"-24" | 80% | 95%-101% |
| 12"-18" | 70-80% | 90%-102% |
| 6"-12"* | 67-72% | 82%- 92% |

*(For top 12" standard equipment plus Pneumatic tire rollers are needed.)

Tests on material rolled with the giant pneumatic-tire roller give the following results:

| Depth | Relative Compaction—Before Rolling | After Rolling |
|---|---|---|
| 0"- 6" | 80-85 Aver. 81% | 84-101 Aver. 93% |
| 6"-12" | 75-89 Aver. 83% | 89- 91 Aver. 90% |

Although tests during construction are continuing, the foregoing formation is being made available at this time in the hope that it will be of assistance to other agencies having similar problems. It should be made clear that the foregoing results were incidental to actual construction where speed of accomplishment was vital. Comprehensive tests on other subgrade materials and with various combinations of loading and numbers of feet are still required to develop full efficiency of this revolutionary equipment.

Riprap and mattress construction partially completed, late Oct., 1944

# How Flexible Wire Mattress and Riprap

## . . . was placed along section of Redwood Highway in Northern California to stop bank erosion. Scheuman and Johnson used labor-saving methods to get job done before winter floods

By A. M. NASH
District Engineer, California Division of Highways, Eureka, Calif.

THE huge redwood trees along the scenic Redwood Highway in California state highway district 1 stand for centuries, but not the gravel banks of the Eel River. At the confluence of the Eel and the south fork of the Eel, periodic floods of the last six years have washed away a triangular area some thirty acres in extent until a section of the highway (U.S. 101) was immediately endangered. Fig. 1 shows successive stages of this channel shift, which represents an acceleration of the normal process of loop or curve enlargement familiar to the hydrologist. Whereas in dry summer seasons the channel consists of a wide gravel flat with a trickle of flow, floods carrying as high as 300,000 sec. ft. have occurred, rising 39 ft. above the bed.

In 1938 concern began to be felt for the safety of the road, and riprap together with a flexible wire mat at the toe, of the type used in the recent project herein described, was installed along several hundred feet of bank. This installation, located immediately downstream from the current project has successfully resisted several record floods.

### Permeable Jetties Built

Then in 1939 and 1940 the river began in earnest to change its channel and wash away portions of the triangular flat at the confluence. By 1942 a serious condition had developed and it was decided to riprap the road fill and build three permeable jetties, designed to throw the channel back toward its old location. Meanwhile, the California Board of Water Resources lent a hand, having a keen interest in confining the channel due to the location on the far bank of the famous Founders Grove of hugh redwoods, including the world's tallest known tree (364 ft.). The Board initiated protection work consisting of a permeable wood pile jetty upstream (Fig. 1) and a draglined pilot channel across the flat, flanked by spoil banks. This work was done in 1944 concurrently with the state highway-department's project, which was altered slightly to dovetail with the Board project.

### Design and Construction of Jetties, Mattress and Riprap

The design details adopted for protecting the highway are partially shown in Fig. 2.

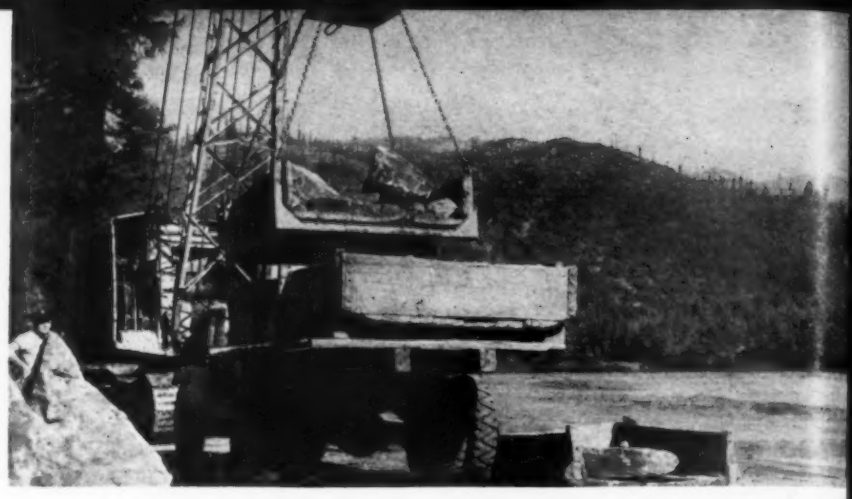
For the jetties, wood piles in two rows 6 ft. apart and spaced 8 ft. on centers were driven to a penetration of about 20 ft., the cut-off elevation extending to about 11 ft. above the bed or high enough to catch all but the higher floods. Lines of barbed wire 6 in. apart were run along both rows of piles to catch drift and thus accelerate the depositing of silt and sand burden. Piles were driven with the same crane and hammer used by the Water Resources Board on its downstream jetty.

Riprap was placed at the outer end of each jetty to a depth 4 ft. below the bed and 6 ft. beyond the piles. Individual stones for the outer 14 ft. of protection were required to weigh 1,500 lb. minimum; for the remainder, 60 per cent were to exceed 2 ft. diameter.

Immediately downstream below each jetty a cut-off trench was dug through the fine sandy deposit and backfilled with large stones to a depth of 13 ft. Cut-offs were carried to the top of the embankment at vertical depth of 8 to 10 ft.

The next step was to dress the road embankment to 1½ to 1 slope, the procedure depending on the degree of the existing slope. Excavated material was deposited as a leveling floor along the newly formed toe, and

A couple of big fellows arrived for the riprap, which called for 25% volume in stones of 2 tons or larger. These stones required skillful loading by the shovel operator (2 yd.) and imposed quite a strain on the hoist body in dumping



A useful idea on this job was the use of two slings which set together to form a truck bed

Stage in mattress construction—lower layer of fence wire lapped in place and stones being laid preparatory to folding the wire over

After large stones were individually set, the remaining small stones in each sling were dumped by tripping two chains as shown

Stones for the mattress, ranging from 3" to 8" in size, were separated by hand and loaded into wheelbarrows with the help of a grizzly in the tail gate of the gravel truck

How stones were formed into baskets, with seams located at wire splices

Lever and fulcrum device built by contractor for use in raising lower strand of wire while wire ties were twisted in place

After wire had been folded over—cables being anchored

at this stage a deadman was constructed consisting of logs anchored at intervals by driving lengths of salvage railroad iron about 16 ft. long. The posts were spaced at the center of each "basket" of the wire mattress, to be described. A shovel, dragline, bulldozer, and sheepsfoot for tamping backfill over the logs, were the principal equipment.

### Ingenuity Saved Labor on Riprap and Mattress

On completion of deadman and bank grading, work began simultaneously on riprap placement and construction of the mattress. Plans called for riprap 5 ft. thick level measurement and carried 45 ft. above the streambed. Stone varied up to the largest that could be loaded out from a nearby quarry with a 1½-yd. dipper on a 1¼-yd. shovel. Specifications required that at least 25 per cent of the riprap by volume consist of stones exceeding 2 tons, 50 per cent exceeding one ton, and 75 per cent one-quarter ton, the interstices to be filled with smaller stones. The contractor was fortunate in finding a deposit of partially shattered, metamorphosed sandstone which required no blasting.

Stone totaling 4,000 cu. yd. was delivered five miles by two 7-yd. rock-body dump trucks and threee 5-ton trucks equipped with special twin loading ships carried on a flat bed. Large stones for individual setting by the crane were delivered by the dumps, the crane picking them up with the customary wire rope sling.

Most useful device on this job was the use of skip "half-bodies" for hauling shovel-run material. Two skips were built, each with three sides, so that when placed together on the truck they formed one large 4-sided

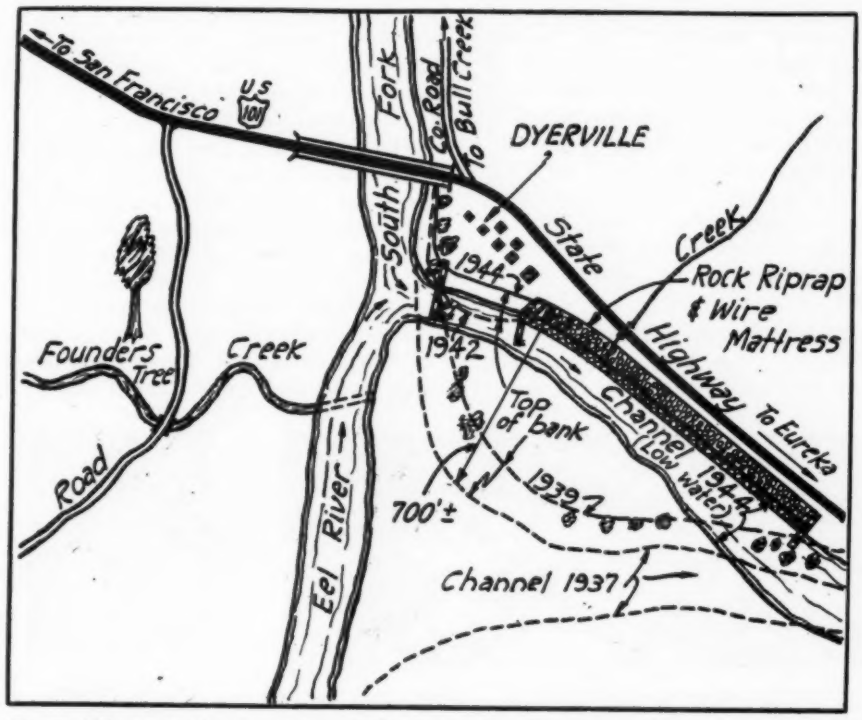



Fig. 1—Why protection was necessary. Successive stages in erosion of delta at confluence of two streams bordering the Redwood Highway

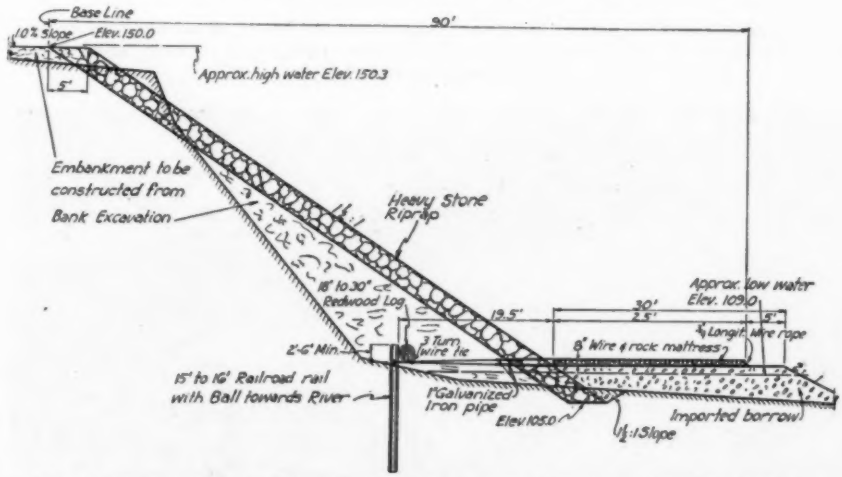



Fig. 2—Cross section of embankment showing details of riprap and flexible blanket

Handy tool which made quick work of twisting wire ties or staples

carrying bin. On arrival at the crane the big stones were first picked up and placed with a single chain. Then, using all four spider chains, each 3-sided strip was lifted and smaller stones and spall material dumped in the bank by tripping two chains and letting the box unload, dragline bucket fashion.

One man on the bank to fix the sling or attach spider chains, and one man down on the riprap to spot the unloading, were all that were needed to set stones as fast as the shovel could send them out.

### Wire Mat Required Hand Methods

Before placing the mattress a layer of gravel with large boulders removed was placed to about 23 ft. width and spread into a level base 34 ft. wide with the dozer.

The mattress consisted of two layers of diagonal weave (2½-in. square) galvanized wire fence, separated by an 18-in. layer of 3 to 8-in. selected river boulders, tied into sections or baskets at intervals equal to the width of the fence strips. Fencing of two widths (12 ft. and 6 ft.), were obtainable and these widths, minus about 10 in. (3 strands) for lapping, determined the spacing of the deadman posts as well as pillow tie lines. Mattress strips about 50 ft. long laid transversely were folded over and tied back to form pillows about 23 ft. wide, the total length of this construction being 365 ft.

The theory of this construction, borne out by experience, is that should the mattress become undercut, they will bend, sag and progressively drop at the outer toe until the erosion tendency ceases or until they set as a slope paving.

The mattress is tied together with a wire cable system consisting of the following: ½-in. cables anchored to the deadman, passed under the mattress at midpoint and looped back over it to anchors in their centers; similar cables looped at either end of the entire construction; ¼-in. cables at mattress joints, woven through both upper and lower strands of the lapped wire, and also looped back to a wire anchor; and a ¾-in. cable running along the outer toe of the construction, being passed through the transverse looped cables and tied with cable clamps to hold the whole system together.

### Grizzly on Back of Truck

After unrolling and tying together the lower layer of wire, stones were wheelbarrowed into place and carefully set by hand. The 3 in. to 8 in. stone grading was obtained by working stones of this range through a tail gate chute into the barrows by hand, letting small pit-run gravel and dirt drop to the ground through an improvised grizzly.

Before placing stone, galvanized tie wires or staples were inserted in the lower mat at 24-in. intervals each day. As soon as placement of stones was completed for a pillow or envelope, the wire and cable were looped over and tying done with specially devised hand tools. In tying the joints or seams it was necessary to pry the lower wire upward while ties were twisted in place. A contractor-built fulcrum expedited this troublesome work, while the time of twisting the wire ties staples was reduced to a few seconds by employing a simple twisting hook on the end of an ordinary rachet-type carpenter's auger.

Scheuman and Johnson, of Seattle, held a $56,000 contract for the foregoing, which comprised minor clearing and grubbing, 7,000 cu. yd. of unclassified excavation, 850 cu. yd. of structure excavation; 1,800 cu. yd. of imported borrow (mattress base), 4,000 cu. yd. stone riprap, 8,700 sq. ft. flexible mattress, 355 ft. reduced logs, 144 jetty piles and 10,000 ft. B.M. of pile bracing. This firm took a gamble (and won) on completing the job during the past autumn. Had winter floods set in prematurely, not only would the highway have been endangered but partially completed contract work would have been damaged or destroyed and the job delayed until spring.

This project was supervised by District 1 forces of the California Division of Highways at Eureka, A. M. Nash, district engineer, C. P. Sweet, district construction engineer, and H. H. Hansen, project engineer.

Left to right: C. H. Johnson, of Scheuman & Johnson, contractors, who held riprap contract; C. P. Sweet, dist. const. engr.; W. H. Pierce, equip. supt.; H. R. Langworthy, asst. highway engr.; C. Morrison of state staff

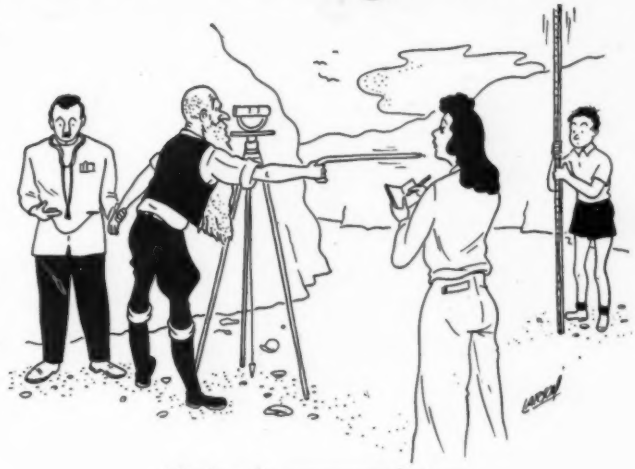
H. M. Hansen, resident engr.

Showing one of the three permeable jetties in relation to the 365 ft. of mattress and riprap. Partly weed-covered slope in background is of earlier riprap and mattress construction which proved successful

**Iron and Steel in Wartime Highway Construction**—Before the war, average Federal-aid highway construction required the use of one ton of iron and steel for each $935 of expenditure. Under the wartime conservation program, the requirement for these critical items has been cut to .54 ton for the same expenditure.

# Road Building to Need Young Men

***The problem of highway personnel returning from military service and the need for attracting capable young men to highway organizations, as summarized at the annual meeting, Association of State Highway Officials, last month at Cincinnati***



Meeting the manpower shortage

By W. H. ROOT
Maintenance Engineer
Iowa State Highway Commission, Des Moines

WE CAN dispose of the first part of this question very concisely. When one of our employees returns from military service he must be put back to work in his old job if he is physically fit. If he has suffered injury, then we should find some job for him that he can do.

Now as to attracting capable young men into highway organizations; I am sure you are not interested in my personal opinion, so I have attempted to conduct a little Gallup Poll. Frankly, I have had in mind primarily the engineering employees of the highway departments; however, I believe the points developed with reference to engineers apply equally to labor and clerical employees.

First, I polled a number of the leading engineering schools of the country to see what they thought of state highway jobs for young engineering graduates. In answer to the question, "What are the pertinent things a job should offer to interest capable young engineering graduates?" the professors indicated the following:

1. A salary equivalent to the normal salary in industry;
2. Continuity of employment;
3. Prospects for advancement and reward for special ability;
4. Freedom from politics.

The almost unanimous opinion of the educational institutions was that highway departments at the present time are not meeting even a fair percentage of the above qualifications.

The next question asked the pedagogues was probably a little unfair. It was, "Do you recommend that your better graduates apply for state highway jobs; do you take a neutral attitude; or do you recommend against their taking such jobs?" Naturally, they practically all answered that they tried to be neutral in this matter. However, it was evident by their replies that under present conditions they are certainly not crowding highway jobs on to their graduates.

To illustrate the replies received to our fourth question, which was "If it is true that highway departments are not attracting the best young graduates, what should they do to make state highway engineering jobs more acceptable?" let me quote from a few of their letters. I wish to state that while these quotations are out of context, it is my honest opinion that they still represent the thoughts of the authors.

1. "I am afraid that the advancement of many men is hampered by political set-ups."
2. "In some highway departments older men are in charge and they have not encouraged the use of new ideas."
3. "The salaries of highway departments are not attractive when compared to those paid by private corporations."
4. "I was quite surprised this past week to learn that two men who had worked up to very responsible jobs with our highway department had decided to resign and enter private practice."
5. "I think one of the important things is the attitude of the older man to give the younger man credit where he does something and to advance him as rapidly as possible."
6. "Highway departments construct highways and maintain them; but they do not operate them, and therein they differ from the railways and from industry. They cannot offer the variety of attractive positions associated with operation."
7. "The highway departments may adopt either of two policies: (a) Hire mediocre men of small ambition and keep them permanently in routine jobs, advancing some of the better of them to the key positions, or filling the key positions with outsiders; or, (b) hire high grade young graduates some of whom will stay to fill the key jobs while the others move on into other fields. The highway department can be a cul-de-sac or a gateway to opportunity."
9. "This statement may be too critical, but I am sure there is great room for improvement as far as the relations of a young engineer and the departments are concerned."
10. "I think that all that it is necessary to do to attract some of the best engineering graduates to highway department work is to make the salaries all along the line comparable to those offered in other fields and get rid of the political influences which the students detest. If that is impossible, then it is impossible for the highway departments to get the better students."
11. "Our very best civil engineering graduates seldom seek employment in our state highway department, and if they do so, they seldom stay there for long."
12. "The young engineering graduate is interested in accepting employment with a progressive organization, an organization which is willing to try new ideas to meet an ever changing world."

Next, I contacted a number of states, some of which have retirement plans, to find out just what is being offered young engineers by the state highway departments. The first question asked this group was "Do you

## Summary of Questionnaires on Employment of Engineers

| | State Highway Departments | Public Roads Administration | Counties | Cities | Railroads | Industries | Ave. of all except St. Hwy. Depts. |
|---|---|---|---|---|---|---|---|
| What is the average monthly salary paid by you to young engineering graduates? | 138 | 203 | 148 | 208 | 156 | 167 | 173 |
| If such graduate makes good and continues to work for you ten years, about what average salary can he hope to be drawing? | 253 | 319 | 258 | 285 | 312 | 305 | 287 |
| Assume an engineer age sixty has worked for you for a period of 25 years; that during that time his average salary has been $200 per month. He is now drawing $300 per month. If he is incapacitated on account of age or injury, would he draw a retirement wage, and if so, how much per month? | 50%* with Retirement Plans 115<br>50% No Retirement Plan | 107 | 102 | 120 | 45 | 70 | 87 |
| What other benefits do your jobs offer engineers? | Sick leave; vacation | Opportunity for advancement; continuity of employment; automatic promotions; annual leave sick leave; vacation | Sick leave; vacation | Sick leave; vacation; Civil Service | Medical & hospital care; promotion; vacation; passes | Sick leave; vacation; opportunity for advancement; death benefits | |

*50% of the state answering.

consider that your wage scale and other job benefits which you are able to offer will attract the better engineering graduates in the postwar period?" The answer was a resounding "NO," with one exception, and a study of the situation in that particular state makes it clear why they were able to answer "Yes," and incidentaly in a way indicates what the other states must do in order to answer this question in the affirmative. The other questions submitted to the state highway departments were the same as those submitted to the Public Roads Administration, to a number of the larger counties of the country—likewise, a number of city administrations, and a large number of our industrial competitors. These were as follows:

1. What is the average monthly salary paid by you to young engineering graduates?

2. If such graduate makes good and continues to work for you ten years, about what average salary can he hope to be drawing?

3. Assume that an engineer age 60 has worked for you for a period of 25 years; that during that time his average salary has been $200 per month. He is now drawing $300 per month. If he is incapacitated on account of age or injury, would he draw a retirement wage, and if so, how much per month?

4. What other benefits do your jobs offer engineers?

The replies have been summarized in the accompanying table, and it seems to me they are quite conclusive.

I do not purport this discussion to be an answer to this most perplexing problem. As stated in the beginning, I am not attempting to give you my opinion of this matter. If this indictment seems too severe do not blame me. I have only attempted to present to you a fair and honest digest of the opinions of a representative cross section of engineers in the United States.

It seems to me that the replies to these questionnaires (1) prove that the state highway departments do have a real problem in the matter of building up and maintaining their engineering forces; (2) show rather specifically what this problem is; and, (3) suggest at least some possible remedies.

I do not consider the situation at all hopeless. A disease properly diagnosed is at least half whipped. I am not of the school that believes that airplane transportation will supplant to a large extent motor transport. I think that in highway design, construction, and maintenance, we have merely scratched the surface. It seems to me we are entering into a period of tremendous activity in highway construction, and that this program will present a real opportunity to young engineers. However, state highway departments must realize that this is 1945, not 1915. They cannot hope to solve the problem of the 1945-55 decade with Model T methods.

This Association can well afford to give this subject further intensive study.

## Post-War Notes

Of special interest because it represents a county fringing on a metropolitan area (Detroit), yet having local rural traffic problems, is McComb County, Michigan. The county's road commission has programmed $3,657,000 in "immediate" postwar road and bridge projects and additional future projects to cost $1,278,000. Largest project is an access road to the Huron Points bathing beach at Mt. Clemens, under the Huron-Clinton Metropolitan Authority's recreational plan.

▼

A contract for surveying the first 50-mile section of a proposed superhighway from Kittery to Fort Kent has been awarded to the Coverdale Colpitts Company of New York by the Maine Turnpike Authority.

Joseph T. Sayward, chairman of the Authority, said the engineers "would report to those who would be interested in underwriting bonds through which the highway would be financed."

Rhode Island has a 35-mile scenic coast highway up for consideration. Tentatively okeyed by the state planning board, it would involve relocation of some present shore routes to bring the road nearer the ocean. The planning board will begin a study of its feasibility, according to board secretary Raymond A. McDonald.

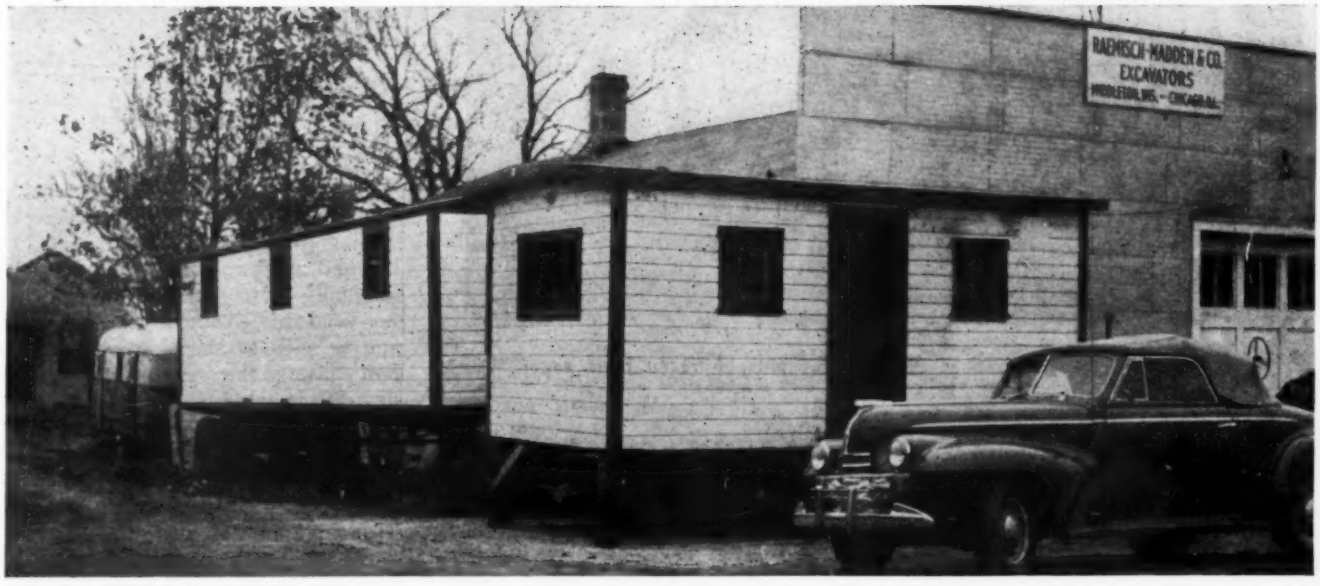
▼

### Submit Dallas-Fort Worth Expressway Suggestion

How a $60,000,000 no-stop-light express highway between Dallas and Fort Worth might be developed as shown in a general scheme with visualizing illustrations, submitted to PRA, the Texas state highway department and the cities by a group of consulting engineers in Austin. The report was presented by Lawrence S. Waterbury for Parsons, Brinkerhoff, Hogan & McDonald of New York City.

The proposed route would parallel north of present U. S. 80. Over $13,000,000 would go for right-of-way.

# Equipment Maintenance




How portable office and parts wagons were set up on blocks alongside temporary shop headquarters near the job. Office car in foreground, tractor and bearing stockroom parked in rear

## Modern Service Depot on Wheels

### Caravan of parts wagons as well as a heavy-duty service truck follows this earth moving contractor from job to job

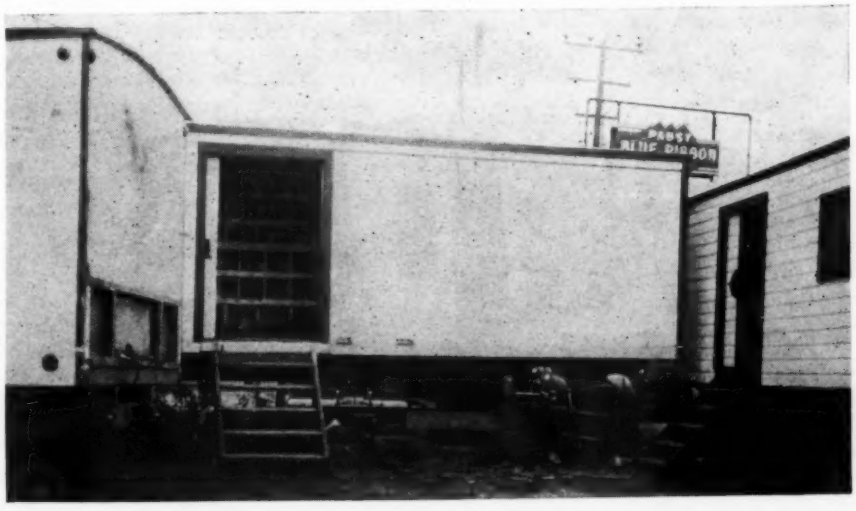
A TRAVELING storehouse containing replacement parts, supplies and tools is part of the operating methods of Raemisch-Madden & Co., excavating contractors of Middleton, Wis., and Chicago.

How this idea is adapted to a typical job was to be seen along U. S. 66 south of Pontiac, Ill., this past autumn, where the firm's grading outfit was being used on White Consolidated's two contracts. The job involved 440,000 cu. yd. of roadway excavation and borrow on a 15-mile section of highway graded for ultimate 4-lane divided construction.

Raemisch-Madden moved on to this job by taking over a roadside garage in a small town midpoint along the work. Only a minimum of equipment necessary to do overhauls was installed here. This included a small hydraulic press, motor bench, grinders, etc. The plan was to do welding and minor repairs out along the job whenever possible.

The company's mobile units were then pulled into the yard one by one by a trailer truck and spotted in an arrangement giving accessibility from the garage. These units included the following:

1. An office car, located in front (see nearest car in photo above).
2. A car for parts for the tractor models on which the firm standardizes. This car was set up back of the office car, close to the side door of the garage or shop room, with the door side of the car toward the building.
3. A car for scraper and diesel engine parts.



This car is for scrapers and diesel engine parts. The car at the right is for bolts, nuts, tools, etc.

Raemisch-Madden's storekeeper, H. W. Wipperman, inside of tractor parts wagon. This shows how neatly the stock bins are kept

4. A car for bolts, nuts, small tools and miscellaneous smaller items such as pumps, small light plants, etc.

Each of these cars is a special weather-tight box-car-style wood-body job, designed and built by the contractor's men. Around the walls inside are bins which were laid out to a definite scheme, representing a lot of figuring to make the best use of the limited space to accommodate the desired list of parts and supplies. Cabinets under padlocks are built into part of the wall space for storing certain more valuable items.

The interiors of the trucks, by the way, are painted white, as well as the exteriors, and are kept as neat as a kitchen.

Each unit is, of course, designed to meet state truck body regulations as to length, width, height, axle load, etc. As soon as a car is set up near a job its tires are relieved by shoring up on corner sills or blocks.

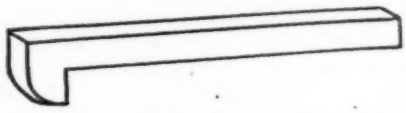
The company's grease truck is also a special body affair with dual rear axle. Inside a waterproof, insulated wood and plywood body are five grease reels at three pressure levels, a pressure water system for filling radiators, small light plant, electric-driven compressor, and grease and oil drums.

Raemisch-Madden started grading on Sept. 12, and by Nov. 15, aided by almost perfect weather, it had moved 344,000 cu. yd., or an average of 38,000 cu. yd. per week (highest week 42,000 cu. yd.). Equipment used included 7 or 8 tractor-drawn scrapers (10 to 20 yd.), 5 self-powered scrapers (12-yd.), 2 push tractors, 2 motor graders and 1 dual-dual sheepsfoot roller. This equipment was split up part of the time. Over half of this yardage came from wide, shallow borrow pits, the remainder consisting largely of excavating roadside ditches through relatively flat terrain and bringing material in to the grade.

The service truck, a heavy-duty outfit which carries grease lines, electric-driven automatic compressor, light plant and pressure water plant

## How to Remove or Replace Shaft Keys

The Bar-Greene Company in its ditcher operator's copyrighted manual B.T. 1032 gives instructions for fitting keyways that repairmen will find widely applicable. The following excerpts are reproduced with permission:

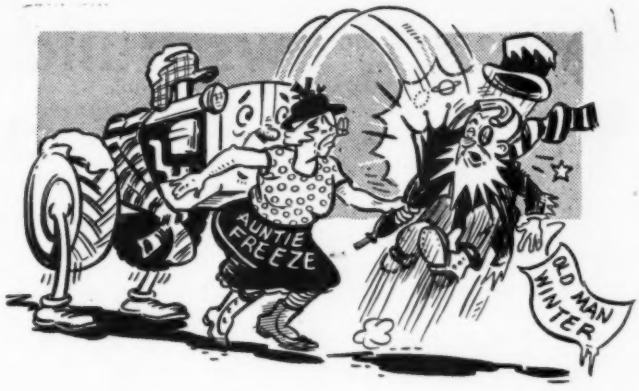


**Gib Key**—These are made with a hook on the head for the purpose of driving a wedge between the head of key and shaft sprocket or gear as the case may be to pull the key endways for removal. The keys are tapered and as soon as they have started to pull endways they usually remove easily. Often when starting these keys the hook head will bend. This may be prevented by tightening an adjustable wrench over the key head and the wedge exerting a pressure toward the wedge side of the key. In fitting a gib key to shaft and sprocket or gear, it should be snug when half way into sprocket or gear. It should drive easily until within ¾ of an inch of the head. It should be left with ¼-in. between the head and sprocket or gear.

**Straight Key**—The keyway shaft should be cleaned out and any rough spots smoothed off with a file. Key should be cut off slightly shorter than the total length of keyway in shaft. Corners of key should be rounded in half-moon shapes to fit the keyway. Key should then be so that it will slide into keyway with the finger but should require light taps of a hammer to drive it clear to the bottom of keyway. If it is tight, the sides of key should be filed. Care should be taken to file it evenly all over the surface of the side. When key fits to keyway in shaft properly, then try sprocket or gear keyway onto the key in the shaft. The sprocket or gear should show an appreciable difference between sliding on the plain shaft and sliding on the shaft and key together. However, if too tight, sprocket should be slid back off and the key filed at the point where it shows gouges from the sprocket or gear. If the part on the key is a sliding member such as the cones on the friction clutches or sliding block on the jaw clutches, the key-

(*Continued on page* 94)

# Cold Weather Tips for Earth Moving Rigs




## How one manufacturer sums up precautions that pay dividends*

By SAM BEEBE
Eastern Service Manager,
R. G. LeTourneau, Inc.

A LOT of earth moving can be accomplished in freezing and near freezing weather. But the equipment must be given a break. These important steps will prepare your outfit for freezing weather and help you make the most effective use of your equipment.

1. Make sure the radiator is protected with anti-freeze in the proper percentage for the weather. A few gallons of anti-freeze, purchased in time, is much cheaper than a busted radiator or cracked engine block.

2. Drain out your heavy summer oils and greases and replace them with the lighter winter-weight lubricants. (Surely, you've done so by now.) Follow manufacturer's instruction books! Summer lubricants become thick and hard when cold, and cannot properly lubricate highly-finished bearing surfaces and other parts of the machine. This could quickly result in costly damage.

3. If Diesel engines become hard to start in extremely cold weather, pre-heating the air taken into the cylinders is usually effective. Some engines are equipped with pre-heating devices. On other engines, careful use of a blow torch on the intake manifold usually will do the job.

4. Keep the batteries charged sufficiently so that the cranking motor can start the engine. To make it easier to start the engines in Super C Tournapulls, pull back the compression release. Then start the engine spinning. When it has attained its greatest momentum, release the compression lever and allow the engine to fire.

5. Always run engine at half-throttle for a few minutes after starting up in the morning. This will permit it to come up to operating temperature before being placed in operation, and will make for longer engine life. Failure of the engine to heat up properly may be due to thermostats not functioning properly.

6. In cold weather, always make sure that the power control unit brake bands are not frozen to the drums before starting operation in the morning. Move the control levers into lockout-position just before starting, freeing the bands from the brake drums. Otherwise, the brake bands might be carried around with the drums, possibly damaging them, and requiring partial disassembly to restore the unit to operating condition.

7. When moving dirt with scrapers in freezing weather, it often pays to use a rooter to break up the hard, frozen top soil. The scrapers can then load without interruption, and obtain large, heaping loads. A dozer also can be used to break up frozen top soil. Dig in with one point of the blade until the frozen soil is broken through, then work the blade under the frozen surface and lift it out in large chunks.

8. If the load-carrying capacity of the tires will permit, a slight reduction in the air pressures should be made when operating over rough, frozen ground. The reduced tire pressures will tend to cushion the harmful, localized shocks encountered by the tires when running over hard, frozen chunks, thereby lengthening tire life.

9. Be sure there is no dirt left in the scraper bowl when shutting down at the end of the shift, as it would be frozen tight by morning, and it would then be necessary to thaw it out before the load could be ejected. Likewise, clean all dirt from the front side of dozer bowls before shutting down.

10. When shutting down for the night, lower the dozer or scraper bowl onto planks, rather than onto the ground. This will prevent the bottom from freezing tight to the ground.

11. As at all other times when shutting down for the night, place a tin can or some similar object over the exhaust stack, to prevent rain, snow, etc., from entering.

12. When Tournapulls or tractors are to be stored in the open and left idle for any length of time, always drain the water from the radiator unless you are sure it is properly protected with anti-freeze. Also remove cylinder block drain plugs, and, on the Super C Tournapull, remove drain plug from the water-cooled manifold.

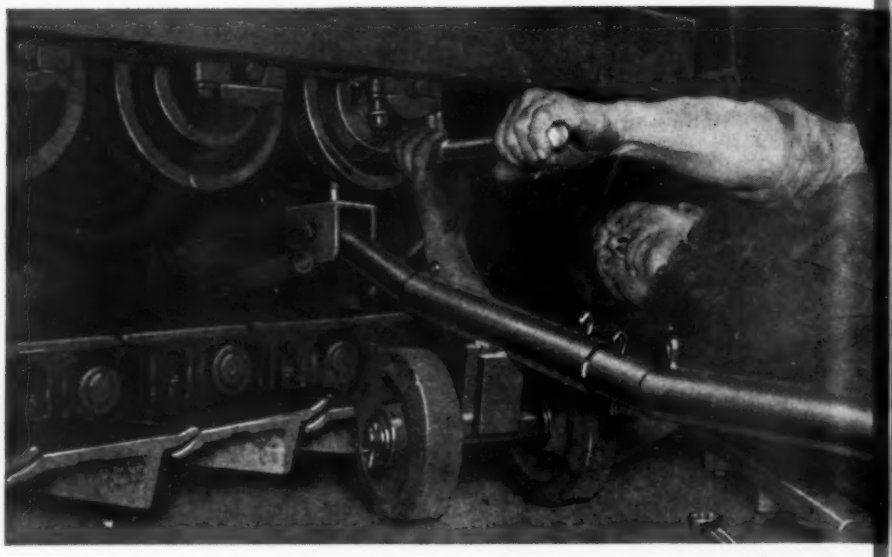
*From the Le Tourneau "Cooperator."

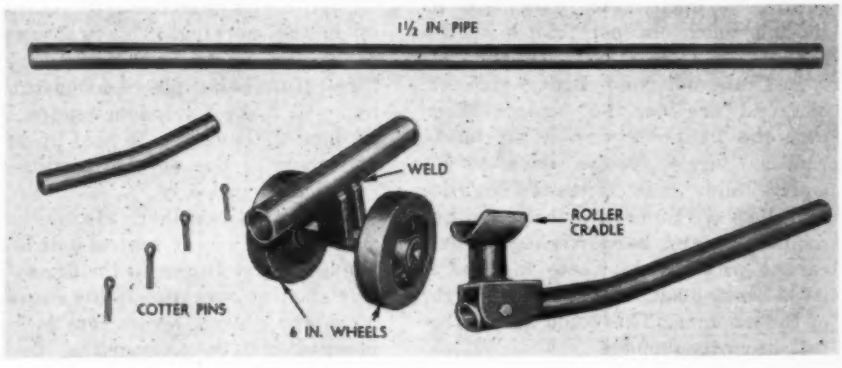
"Horse blankets" over your motors this time of year is a fine idea, IF the cover doesn't restrict engine parts from functioning properly, and IF the operator or service man isn't discouraged from reaching under and servicing the engine as he should. This hooded scraper and push tractor at work in November on the White Consolidated contract on U. S. 66, Illinois (equipment belongs to Raemisch-Madden)

# Army Crews Build Tractor Roller Dolly

WHEN Ray F. Davis, general foreman in the Army's heavy equipment repair shop, Columbus ASF Depot, found the makeshift 2 x 4 fulcrum too clumsy for the job, he devised a lifting dolly for use when installing track rollers on Caterpillar tractors. The dolly makes it possible to hold rollers in the correct position so that the four holding bolts may be replaced with comparative ease.

As reported in "The Maintenance Engineer," published for Army engineer repairmen by the Office, Chief of Engineers, with this device you can save a lot of cussin' while trying to fit these rollers back in place. It can be made from some 1½-in. pipe and a couple of 6-in. wheels. (If industrial truck-type wheels are not available, suitable substitutes can be fabricated from available materials.) The pictures show (1) how to use the dolly; (2) the unit completely assembled; and (3) the various parts. An important feature of the item is that it can be disassembled and made up into a small package for carrying in a truck.






## How to Remove or Replace Shaft Keys

(*Continued from page* 92)

way in the part should be large enough so that no friction is developed from the key itself.

In a few cases we set the bronze bushings into a babbitted seat. When this is the case, the bushings should be tapered on the outside edge that is going to enter into the seat first or it may gouge into the babbitted metal. It will cut a groove into the babbitted seat so that the bushings will not be in true alignment with the part it is being pressed into. When pressing bushing into place, care should be taken that they are started straight with the seat or they will become egg-shaped.

## Babbitted Bearings

(From Barber-Greene Company's ditcher manual B.T. 1032)

In the manufacture of machines, tolerance is used on babbitted bearings of 0.003 to 0.006 of an inch.

When babbitted bearings are solid, a reamer is used just as though they were of a bronze bearing construction. Where the babbitted bearings are in halves, it is still the best and fastest practice to use a reamer by bolting the halves into the base. In the field, quite often it is not convenient to get a reamer and these half bearings can be scraped to fit the shaft using blueing to find the high spots.

By taking off the high spots and then either filing the edges of the halves or shimming between them, it is not a long process to make a split bearing fit the shaft. Solid bearings can be scraped to fit in the same manner but generally speaking the process takes much longer and due to the inaccessibility of all parts of the bearings, it is much harder to get as good a job as is gotten by reaming a solid bearing. When scraping bearing halves, at least 50 per cent of the area should bear on the shaft and most of this area should be in the bottom of the half and not up near the edges. There should not be any rocking motion or any high points which show a hard bearing area on the surface.

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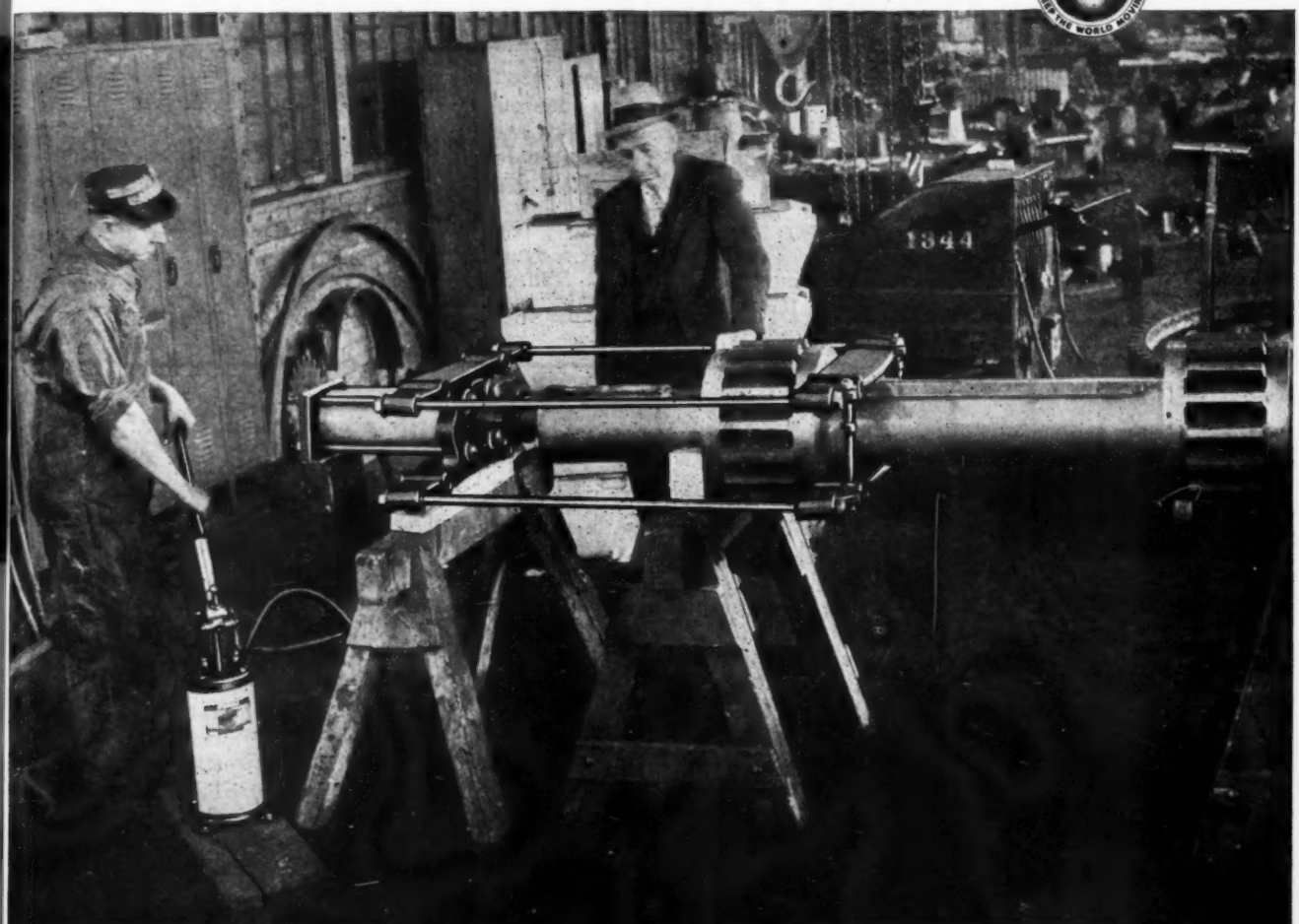


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## RODGERS HYDRAULIC, Inc.

# ★ ★ With Road Builders in Uniform ★ ★

**From the South Pacific to England and from the Aleutians to Burma you'll find them serving today . . . the thousands of road builders who've gone out from contracting firms, state highway departments, and county, city and federal engineering posts. Here is news of a few of them. More next month. Send us your items!**

**James M. Walker**, formerly an engineer with Texas Highway Department, Tarrant County (Ft. Worth), is now a 1st Lt. in the Engineers Corps. His address is 732nd Engineers Dep. Co., Camp Breckinridge, Ky.

Lt. James M. Walker

Lt. Irwin W. Lee

**Irwin W. Lee**, of Peoria, who for 19 years served the Illinois Division of Highways and was well known as a resident engineer on bridge and highway work, was killed in action while serving as a Lieutenant in the U. S. Navy Seabees in the South Pacific. The Naval Construction Training Center, Camp Lee-Stevenson at Quoddy Village, Me., was named after Lee and a fellow officer, George S. Stevenson, fatally wounded in the same action.

▼

**Lt. D. W. Crofoot**, former project engineer of State Highway District 5, Jefferson County, Mo., died Sept. 20 in the Central Pacific area as a result of wounds received in action. He joined the army in 1942.

**Henry Cook**, former county engineer of Tarrant County for a number of years, is a Sr. Lt., U.S.N.R., Advance Base Depot, Davisville, R. I., according to Robert W. Gibbins, County Engineer, Tarrant County, Texas.

▼

**John Beakey**, formerly traffic manager with Oregon State Highway Department and now Captain in the Highway Division of the Transport Corps, was wounded on Normandy Beach, according to word received from Salem.

## Postwar Road Bill to President

The Senate and House on Dec. 12 adopted the Conference Report on the Postwar Highway Bill (S. 2105), thus concluding action on this legislation which has been pending since April 7, 1943. The measure was in the hands of the President for approval as this publication went to press.

### $1,673,250,000 Federal Funds

The final measure includes practically the same authorizations as provided in the House bill, which total $1,673,250,000 representing a three-year program of $1,500,000,000 for Federal Aid and $173,250,000 for highway improvements in public lands. Annual Federal-aid authorizations for the three-year postwar period are: $225,000,000 for projects on the Federal-aid system; $150,000,000 for projects on secondary and feeder roads; and $125,000,000 for projects on the Federal-aid system in urban areas. Annual authorizations for highway improvements in public lands are: $25,000,000 for forest highways, $12,500,000 for forest roads and trails, $4,250,000 for roads and trails in national parks, $10,000,000 for parkways to give access to national parks and $6,000,000 for indian reservation roads.

### Right-of-Way Costs Limited to One-Third

Both the Senate and House bills provided a 50-50 matching basis with regard to construction costs and in addition the House bill included rights-of-way costs on a like basis. The Senate bill made no such provision. Compromising this major difference, the final measure provides that federal funds may not be used to pay more than one-third of the cost of rights-of-way. However, an exception is made in connection with grade-crossing projects where the cost of rights-of-way is allowed up to 50%.

Other new provisions with regard to grade-crossing projects restrict the amount of expenditures to 10% of the sums apportioned to any state and further require contributions by the railways involving up to 10% of the total cost. The liability of the railway is to be measured by the benefits received as determined by the Commissioner of Public Roads.

Retaining the formula provided in the Senate bill, the bill as it went to the President, provides for distribution of funds for the Federal-aid system and secondary roads using the formula of ⅓ area, ⅓ population and ⅓ road mileage, and for urban highways a sole factor of population.

Effective date of the authorizations is based on the termination of the war emergency, with the further proviso that the funds may become available when Congress, by concurrent resolution, finds as a fact that the war emergency has been relieved to an extent that will justify proceeding with the highway program.

## ARBA Meeting Flash

### Don't forget—the Convention is Jan. 16-19, Stevens Hotel, Chicago. Make your plans now

AMONG many prominent speakers engaged for the American Road Builders' Association's annual meeting in Chicago next month are Gen. Philip E. Fleming, Federal Works Administrator; Congressman J. W. Robinson, Chairman, House Roads Committee; Congressman Jennings Randolph (who will outline the new billion-dollar airport project); Herman A. MacDonald, Commissioner of Public Works of Massachusetts and new AASHO president; Alvan H. Hansen noted economist (who will discuss road building in relation to national economy).

Invitations have been sent to many other speakers, including Major Gen. Eugene Reybold, Chief of Engineers, and Admiral Ben Morrell, Chief, Bureau of Yards and Docks, U. S. Navy. The war surplus property problem and many other questions will be prominently represented.

# $4,000,000 Traffic Tunnel Planned for Pittsburgh

ONE of the features of Pittsburgh's $20,000,000 new Penn-Lincoln Parkway (described in June, 1944, R&S), now under design for the Pennsylvania department of highways, John U. Shroyer, secretary, under the supervision of E. L. Schmidt district engineer, is the twin-tube vehicular tunnel which goes under Squirrel Hill and embodies some of the most modern installations in the world.

Adoption of tunnel construction along this rugged stretch of the Parkway was found to be expedient from an economic and safety standpoint, according to Michael Baker, Jr., of Rochester, Penn., consulting engineer on surveying the Parkway project. The tunnel will eliminate excessive grades and avoid many curves.

A unique part of the $4,000,000 tunnel is the "Vertical-Longitudinal Reversible System" of ventilation, developed by Ole Singstad, Chief Engineer on the New York Tunnel Authority and a consultant on this tunnel.

## Details of Reversible Ventilation

This system reduces the fire smoke hazard to a minimum, for under any circumstances the dampers can be controlled in such a way that the smoke, at the source, can be localized in the tunnel by exhausting it immediately through the ceiling ports and thus eliminating it from circulating along the roadway in the tunnel tubes.

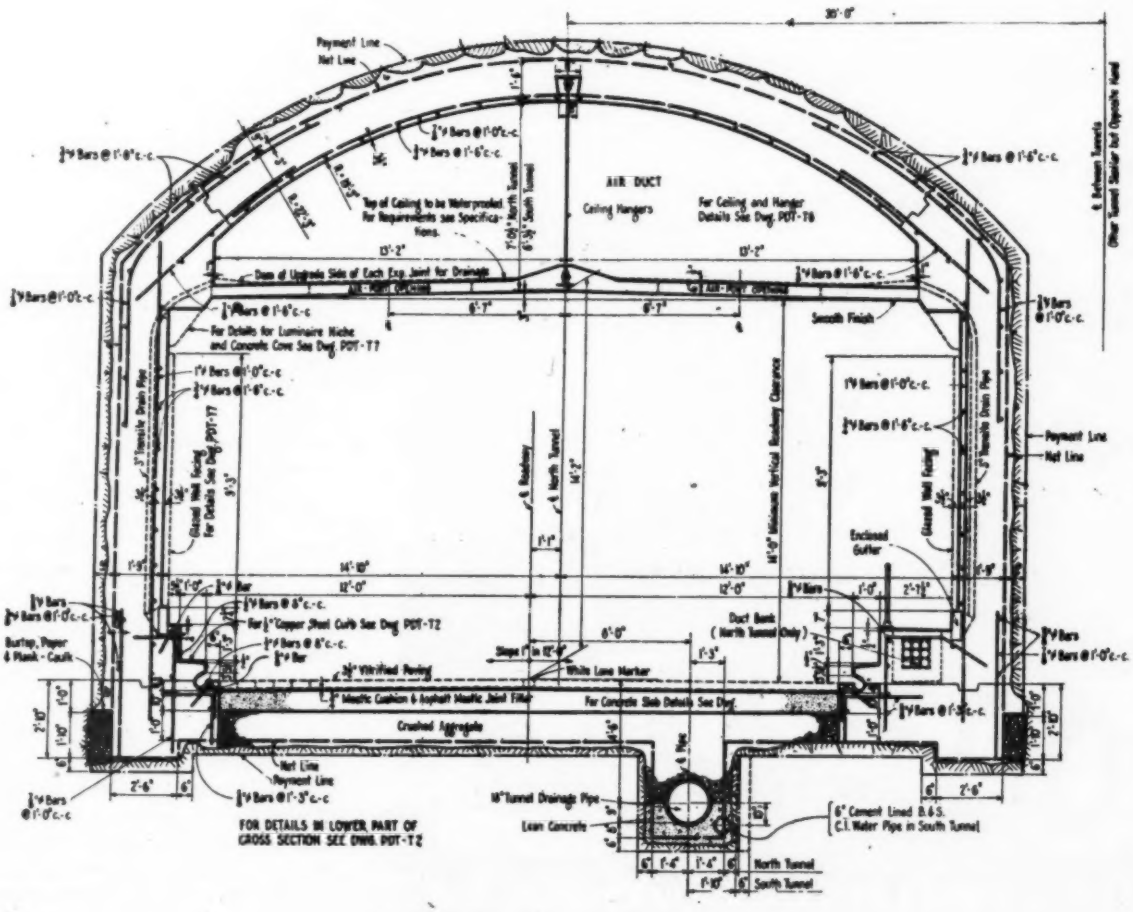
The tunnel structure will be made up of two similar tubes, each providing for two 12-ft. traffic lanes. The tubes will be 4,225 ft. long, parallel to each other, with a constant grade of 2.5 per cent, falling eastward. Center-lines of the tubes will be 60 ft. apart, with a 30 ft. rock pillar support between tubes. The tunnel overburden, varying up to 250 ft. in depth, is composed of stratified shale, sandstone and limestone.

The forced ventilation system to be used will involve two ventilation buildings, one at each portal, serving both tubes for half the distance. Each building will house four units, two blower and two exhaust fans.

Ventilating ducts will be provided in the buildings which will be connected to the tunnel sections, where in each tube an upper duct area has been provided by cutting off the tunnel cross-section with a ceiling at the upper one-third point. Ports in the ceiling will connect the upper duct section with the roadway section, which in turn will act as a duct, extending to the portals. The air flow will be controlled by reversible dampers located adjacent to the fans, and enabling either blower or exhaust fans to be thrown into action on either tube.

The front portion of each building called the air-trap structure, will form the tunnel entrance. Louvres will be placed in the rear and side building walls, serving as fresh air intakes to the blower units. The foul air from the exhaust fans will be ejected through evase stacks extending above the roof.

The functions of the air traps will be essentially related to the longitudinal-type ventilation system employed. In this system, with the tunnel roadway sections on the exit ends of the tubes being used as exhaust ducts, it




TYPICAL TUNNEL CROSS SECTION
SCALE ¼"-1'-0"

is possible, with head-on winds acting from without, and with the same velocity as that of the air moving in the opposite direction through the exit tunnel mouths, to have a static condition in the tunnel, which would deprive the tunnel of proper and safe ventilation. The air-trap structure will be used to eliminate this hazard.

### Tunnel Construction Details

Several types of tunnel construction are involved. For about 3,800 ft., each tube will be entirely in rock. This section is divided into two parts. The lower part, rectangular in shape, provides 14-ft. clearance height and sufficient width for two 12-ft. roadway lanes and a 3-ft. sidewalk adjacent to the rock support between tubes. The tunnel wall lining, made up of the vertical side walls and the top segmental arch, will be reinforced concrete with 2 ft. max. thickness. On the natural rock bottom 12 in. of crushed aggregate will be placed for sub-grade drainage. Pavement will consist of a concrete base and brick wearing surface.

Between the main rock sections and the portal ventilation buildings for about 80 ft. cut-and-cover construction will be used, incorporating a heavily reinforced rigid-frame box section.

The ventilation buildings are located in park and residential areas, and hence will be given a pleasing architectural treatment.

Measures have been taken to insure a watertight tunnel structure. The tunnel lining has been designed to withstand high grouting pressures to insure the ability to use high pressures to consolidate all rock formations outside the lining, and thus form a dense rock lining extending well beyond the concrete lining. All tunnel joints will be provided with waterstops and drains as an added factor against water percolating through the walls.

At the base of exterior side walls, and below the roadway, continuous crushed-aggregate drains will be installed to intercept any water at this level. Ports will be left in the base of the tunnel walls every fifty feet to connect these exterior drains with an extensive system of trench drain pipes in the porous sub-base.

Continuous recessed gutters will run along each roadway curb and empty into catch basins, every 400 ft. These catch basins are provided to take care of the powdered sediment usually found on vehicular tunnel roadways. The overflow pipes from the catch basins will be tied into the transverse roadway drainage pipe

system. The primary function, and in fact about the only function of the roadway drainage system will be to carry off the water, used by the servicing crews, in washing down the tunnels. The Parkway grades will drain away from the portals.

The interior surfaces of the tunnel walls below the ceiling will be finished with a glazed structural facing. The glazed facing will not only give the tunnel interior an attractive appearance, but it will help to increase the lighting and simplifying the maintenance cleaning problems. Between the facing and the concrete a corrugated cement asbestos sheeting will be placed, with the corrugations installed vertically. The vertical corrugations, next to the wall, will be left open to function as a wall seepage drain.

For safety measures, a modern efficient type of lighting system will be installed, which will eliminate all shadows and give a uniform even distribution of light intensity. The luminaries will be placed on both sides of the roadway, in coves on the upper part of the side walls, just below the ceiling. The luminaries in the coves will be tilted downwards toward the roadway so that both direct light rays and reflected light rays from the glazed-faced tunnel walls will be effectively diffused over the pavement.

In addition, at each portal in the tube where traffic enters, for a distance of some 250 ft., a supplementary intensive lighting system will be installed. The portal lighting system will produce effects so graded that during hours of bright sunlight autoists can adjust their vision gradually to full tube lighting.

▼

## Meetings Ahead

American Road Builders Association, annual meeting, Stevens Hotel, Chicago, Ill., week of Jan. 14.

Associated Equipment Distributors, annual meeting, Edgewater Beach Hotel, Chicago, Ill., Jan. 21-24.

National Sand & Gravel Assn., Hotel New Yorker, New York, N. Y., Jan. 23-25.

National Ready Mixed Concrete Assn., Hotel New Yorker, New York, N. Y., Jan. 24-26.

National Crushed Stone Assn., Hotel New Yorker, N. Y., Jan. 29-31.

University of Michigan, 1945 Highway Conference, Pantlind Hotel, Grand Rapids, Feb. 27, 28 and Mar. 1.

Association of Highway Officials of North Atlantic States, annual meeting, Hotel Pennsylvania, N. Y., Feb. 28-Mar. 2.

# New Equipment and Materials

## New 34-Ton Tractor-Trailer Unit

Iron ore from the famous Caune Peak in the Itabira region of Brazil will be moved from the mine to the crusher in the valley below in seven tractor-trailer units of 68,000 lb. capacity each, just completed by The Euclid Road Machinery Co., Cleveland, O., U.S.A., and Easton Car & Construction Co., Easton, Penn., U.S.A. The tractor unit is the product of Euclid and the trailer of the Easton company. There are five forward speeds, ranging from 2.1 to 21.8 miles per hour and a rear speed of 2.7 miles per hour. Overall length is 33 ft. 3 in. Loading height is 8 ft. 3 in.; net weight, 54,500 lbs.; gross weight,

34-Ton Tractor-Trailer Unit

fully loaded, 122,500 lbs. The engine is a Cummins Model 6HBID, 6-cylinder, 150 hp. diesel. The most novel feature of these haulers is the "hydrotarder," a device located in the drive line back of the transmission that utilizes the principle of fluid friction—turbo-centrifugal—to absorb the energy generated by the descending vehicle, permitting it to descend grades at controlled speeds without the use of the service brakes. It is directly connected to the engine cooling system and utilizes the radiator water as a fluid. The mechanical energy changed to heat in the hydrotarder is dissipated by circulating the water through the radiator. Graduated application is obtained by metering the water to the hydrotarder.

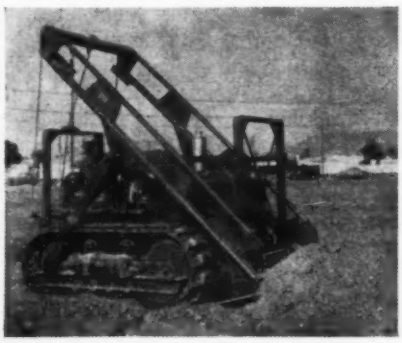
## New Rust Preventive Product

Early in the war the Kendall Refining Co., Bradford, Pa., was called in to attempt to solve a serious rust problem with a Navy Ordnance contractor manufacturing parts and roller bearing for gun mounts. This problem was solved by the use of wax concentrates in solution with petroleum solvents which were peculiar to Kendall's method of refining. Drying time with this product was well under one hour. Further work in the development of this product in connec-

tion with the Corps of Engineers, U. S. A., at their laboratory at Fort Belvoir, Va., and in the Field Maintenance Branch indicated that, not only did Kendall have a product with excellent water repellent characteristics and one which would withstand seashore exposure tests, but was as satisfactory from the protective standpoint in such laboratory tests as ultra violet light, humidity cabinet and salt spray cabinet tests with low temperature characteristics which required ductility at temperatures as low as 20° below zero. The ease with which this product could be applied by brush, spray, or dipping, quick drying times and the ease with which it could be removed by any petroleum solvent or kerosene made it a popular product after its approval at the official Army Testing Laboratory at Rock Island Arsenal. This product rapidly gained in popularity throughout the country until today it has seen use in nearly all of the Army Processing Depots throughout the country as well as in hundreds of industrial plants. The Government has purchased millions of pounds of this product for processing for overseas shipment. This product is now being released for domestic use for the first time, known as Kendall Rust Preventative 5.

## New Tractor Shovel

A new tractor shovel, having 100 per cent cable control over the bucket has been put on the market by M. P. McCaffrey, Inc., 2121 East 25th St., Los Angeles, Calif. By releasing a brake, the operator can dump the load from any height and immediately return the bucket to loading position by engaging the power unit clutch. The bulk of the weight and principal bracings are placed on the truck frames of the tractor. The front



McCaffrey Tractor Shovel

end construction is rigid, with a boxed channel replacing the tractor equalizer spring. The swing frame and tracks are extended and one track

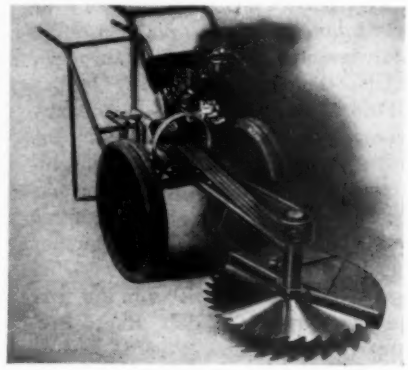
roller is added to each side and front idlers built up. When digging, rub iron on the bucket butt on rollers attached to the rigid front frame, so that there is little push against the side members. When the loader is equipped with a ripper, this attachment can be put in use in a few minutes by atttching the bar to the walking beam and to the ripper. This requires no bolts or pins. Bulldozer is available as optional equipment. This can be quickly installed while on the job. The tractor shovel is manufactured in sizes ¾ yd. to 1¾ yd. It is adaptable to all standard makes of tractors.

## New Moisture Detector

A new Dalmhoist moisture detector for lumber and wood products and various construction materials has been announced by Colloid Equipment Co., Inc., 50 Church St., New York, N. Y. This equipment utilizes the latest ideas in electrical circuits and electronic principles, all of which have been simplified and combined in a practical meter that covers the range of 7 to 25 per cent moisture, with an accuracy of plus or minus 1 per cent. The detector is complete and self-contained. It is used by forcing the electrode needles into the material being tested and the reading is then taken by simply turning the dial knob until a small light above the dial flashes at the correct moisture content.

## New Saw

A new saw brought out by Harry A. Lowther Co., 141 West Jackson Blvd., Chicago 4, Ill., has a constant centered drive, a patented feature, which is claimed to insure belt alignment no matter what the alignment. The saw is stated to operate at any angle on or off the ground. Four 112-in. V-belts connect two constant centered drive pulleys. Wheels have needle bearing, and have heavy duty industrial type dual pneumatic tires as optional equipment for easy rolling over loose, sandy or soft ground.



Lowther C-Saw

The unit has a 6 H.P. air cooled engine, electrically welded tubular steel frame, saw mandrel equipped with Timken roller bearings and grease seals. Saw has 30-in. blade with extra large teeth and extra deep gullets. It has a speed of 1,150 r.p.m. The saw is stated to have cut through a 24-in. hardwood tree in less than 3 minutes.

## New Lathe Center

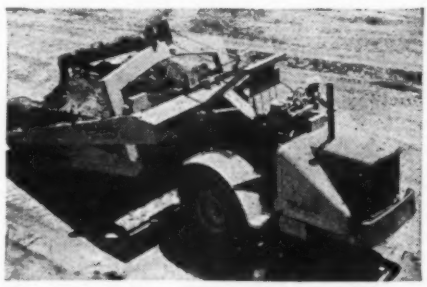
A "Live" lathe center for handling heavy loads up to almost six tons has been announced by the Ideal Commutator Dresser Co., 1372 Park Ave., Sycamore, Ill. This new center, called the No. 6MH, has a guaranteed tolerance of .0000 to .0005. To handle radial loads up to 5,750 lb. and thrust loads up to 8,500 lb., a special bearing arrangement is used. Two precision ball bearings in tandem support the spindle at the front; and two angular contact ball bearings preloaded, support it at the rear of the housing. This arrangement also eliminates radial play and possible chatter. For positive protection of these bearings against the entrance of chips, dust, coolant and other foreign matter, two sealing rings are used. A unique feature of design is the ease in re-

dressing the point. The center is simply inserted in the lathe tailstock with the retainer plug removed. Then a small steel rod is screwed into the threaded hole in the end of the spindle of the live center. By rotating the spindle point with this rod and by using a tool post grinder, accurate redressing of the points can quickly and efficiently be made.

▼

## New Self-Propelled Scraper

A new self-propelled scraper stated to embody many new features has been placed on the market by Wooldridge Manufacturing Co., Sunnyvale, Calif. The unit has a positive 2-wheel hydraulic steering system, stated to give the operator full control at all times by maintaining a fixed direction of travel over all types of ground and at all speeds. No steering clutches nor individual front wheel brakes are employed. Both drive wheels turn at exactly the same time under full traction and power by means of a single steering bar. The prime-mover is powered by a heavy duty diesel engine with four



Terra-Cobra Earth Mover

speeds forward, plus a reverse gear, and attains travel speeds up to 20 m.p.h. Flexibility of travel over rough ground is accomplished by means of a massive universal oscillating kingpin which couples the prime-mover to the heavy duty scraper. Due to its dual operating action, this pivot is stated to allow free radial turning to right or left while either or both units are tilted in opposite diagonal planes. Another feature is the powerful, yet smooth air operated cable hoist. Braking power is applied by powerful air brakes on the rear of the scraper and equally on both wheels at the same time.

▼

## New Mobile Air Cleaner Field Test Unit

The Donaldson Co., Inc., St. Paul, Minn., makers of oil-washed cleaners and the positive system of crankcase

ventilation has brought out a new, mobile air cleaner field test unit, which is offered to manufacturers for their use without cost or obligation. This unit can go anywhere on its two-wheeled chassis behind any passenger car. For purposes of duplicating working conditions in the field it can be drawn behind the tractor or other machine. Or, it can be parked adjacent to stationary units in operation. Completely self-contained it is equipped with two internal combustion engines with power individual blowers to provide the desired air flow for testing purposes. As many as four cleaners can be tested simultaneously. The unit was developed to substantiate laboratory findings and to make field testing easier and more accurate.

## Obituaries

BEVERLY L. SNEAD, 70, vice president of the Virginia Bridge Co., died Nov. 27 in Washington, D. C. He had been working with the War Department in connection with bridges used by invasion forces.

JAMES W. GRIFFITH, 50, county highway superintendent of Lincoln County, South Dakota, died recently in Canton, S. Dak.

FREDERICK A. SMITH, 88 for many years engineer with the Board of Local Improvements of Chicago, Ill., died Nov. 13. When the magazine *Engineering and Contracting* was started in 1906, Mr. Smith was one of the editors.

SGT. ROBERT W. HADDEN, 31, son of Samuel C. Hadden, Chairman Indiana State Highway Commission, was killed in action in Germany on Sept. 25.

J. CRAIG MCMANUS, 53, superintendent and partner in the firm Cameron, Joyce & Co., Keokuk, Ia., died recently.

SAMUEL KNOPF, 55, principal assistant engineer of the Delaware State Highway Department for the past 27 years, died recently. He began his highway engineering experience in 1915 under Charles M. Upham, as chief draftsman on the construction of the Coleman Du Pont Boulevard. Two years later he became principal assistant engineer of the Delaware State Highway Department.

A. J. HAMMOND, 75, member of the construction contract board of the office of chief of engineers, War Department, died Dec. 1 in Washington, D. C. He was a consulting engineer with offices in Chicago, Ill. He was a former president of the American Society of Civil Engineers.

## Literature Received

"ROADSIDE DEVELOPMENT"—a compilation of reports and special papers on this subject, presented at the 1943 annual meeting of the Highway Research Board. Gathered by the Board's committee on roadside development and edited by Fred Burggraf, ass't. director of the Board, Washington 25, D. C., this compilation includes 108 pages of papers and data on a score of topics together with U. S. Corps of Engineers specifications on airfield grassing, topsoiling, seeding, sodding, etc.

PROCEDURES FOR TESTING SOILS—A 210 page compilation has been issued by the American Society for Testing Materials, giving in addition to all the A.S.T.M. standard methods, some 38 suggested procedures for investigating soil and soil mixtures. A copy can be obtained from A.S.T.M. headquarters, 260 S. Broad St., Philadelphia, Pa., for $2.25.

WARTIME ROAD PROBLEMS—Pamphlet No. 9, recommended practice for treatment of city pavements, Highway Research Board, 2101 Constitution Ave., Washington 25, D. C., (Based on committee report given at last annual meeting of the Board.)

# With the Manufacturers

## H. O. Penn on Tyson Bearing Board

E. R. Galvin, President of the Tyson Bearing Corporation, Massillon, O., has announced the election of Hamilton O. Penn of New York as a director. Mr. Penn heads the H. O. Penn Machinery Co. of New York, one of the largest distributors of construction machinery in the United States.

H. O. Penn

Among his many activities, Mr. Penn, during the early critical days of the war, was a Dollar-a-Year man with the War Production Board, in charge of the inventorying of all used construction machinery and making it available for war work.

▼

## LeTourneau Advertising, Training Chiefs Named

Appointment of Eugene E. Weyeneth and Joseph G. Van de Loo as manager and assistant manager, respectively, of the firm's advertising department, and Robert G. Prince as manager of the company training department has been announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif. Mr. Weyeneth and Mr. Van de Loo, with LeTourneau for nearly ten years, wrote much of the copy which brought their organization a national advertising award. Mr. Prince was a schools educator before joining LeTourneau in 1942. The trio succeed George C. McNutt, LeTourneau advertising manager for the past decade who resigned Nov. 15 to return to California, and A. B. Thomson, who left R. G. LeTourneau, Inc., to join Lyle Hosler, Advertising, Peoria.

Left to Right: Joseph G. Van de Loo, assistant advertising manager; Eugene E. Weyeneth, advertising manager, and Robert G. Prince, training manager

## J. R. Drummond Promoted by Timken

J. Ringen Drummond, experimental engineer, has been appointed assistant factory manager of The Timken Roller Bearing Co., Canton, O. He succeeds H. M. Richey who became Factory Manager last December. Drummond, who joined the Timken Company in 1926 as chief inspector and, later, assistant superintendent of their Columbus, O., plant, has been doing experimental engineering in the Canton plant since 1932.

▼

## R. A. Dittmar Appointed Chief Engineer Universal Atlas

The appointment of Richard A. Dittmar, Plant Manager of the Hudson, N. Y., plant, as chief engineer of the Universal Atlas Cement Co., New York, a United States Steel Corporation subsidiary, to succeed Sidney J. Robison, retired, was announced, Dec. 4, by Blaine S. Smith, President of the company. Mr. Dittmar has been in charge of the Hudson plant since 1924. He has been with the company 31 years, having started at the company's Hannibal, Mo., plant in 1913.

▼

## A. E. Heath Promoted by Gar Wood

Glen A. Bassett, president of Gar Wood Industries, Inc., has announced the promotion of Amos E. Heath, formerly manager of the company's Washington branch, to the new position of general district manager of the Washington and Central Seaboard District. Mr. Heath has been with the company for the past 22 years, five as a salesman and seventeen as manager. In his new position, Mr. Heath will serve as Gar Wood Industries' liaison with the Armed Forces and all government departments. He will also supervise all distributors, dealers and branches in the territory which consists of Maryland, Virginia, West Virginia, North Carolina and South Carolina.

A. E. Heath

# Clearing House

## WANTED
National
## DISTRIBUTOR
by old established
PNEUMATIC TOOL CO.

Manufacturer of Quality Pneumatic tools, established for over fifty years is planning its post-war distribution of entire line of forged tools for the construction trade.

They seek an organization — with established contacts in this field — which has adequate financial backing to take over distribution for the entire United States.

Address your reply to
P. O. Box 1562
Pittsburgh 30, Penna.

## WANTED TO BUY
Low semi-trailer, standard make, with tandem axle with not less than twelve wheels, minimum capacity 20 tons—25 preferred.

**Diamond Engineering Company**
700 South Monroe Street
Grand Island, Nebraska

## FOR SALE

**Shovels—Cranes—Draglines**

Lorain 79 Diesel Comb.
Lorain 75B and 75A gas.
55 Lorain Comb.
No. 7 Northwest, high gantry, extra long cats.
Lima 801 Dragline.
Bucyrus-Erie 50B steam 2 yd.
Marion Model 21 steam.
301 Koehring combination.
37B Bucyrus-Erie.
43B Bucyrus-Erie.
150 P & H Truck Crane.
P & H 10-wheel truck crane.

**Caterpillar Tractors**

D8 with 30 yd. LaPlante-Choate Scraper.
D7 with LaPlante-Choate Angledozer and 8-yd. Carryall Scraper.
RD8 with LeTourneau Angledozer.
60 with LeTourneau-Choate Dozer.
50 gas with Euclid Hydraulic Bulldozer.
30 with LaPlante-Choate Bulldozer.
20 with Bros Hydraulic Bulldozer.
D4 with LaPlante-Choate Angledozer.
D4 with Trackson High Lift.
D2 with LaPlante-Choate Bulldozer.

**Tractors**

Eagle 4-wheeled, 3-4 plow, rubber-tired.
Cletrac Model E with power pulley.
T-20 International with Bucyrus-Erie Angledozer.
Two 10-20 Internationals, rubber-tired.

**Graders**

77 Austin-Western.
99 Austin-Western.

**Scrapers**

Model J 12-yd. Carryall.
Euclid 5' and 6' Rotary.
Euclid 2-wheel trailer type.

**Miscellaneous**

Three Koehring Dumpsters with Cummins Diesel Engines.
P & H Backfiller, completely rebuilt.
Foote No. 26 Paver.
Jaeger 7S Concrete Mixer, power hoist, 4 rubber heavy duty 6-ply tires.

THE CHAS. M. INGERSOLL CO.
19930 Detroit Road Rocky River, Ohio
EDison 1010.

## TRANSITS and LEVELS

*New or Rebuilt*
*Sale or Rent*

Headquarters for REPAIRS—any make. Factory Service. We will also *buy* your old instruments or take them in *trade*.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-12.

**WARREN-KNIGHT CO.**
*Manufacturers of Sterling Transits and Levels*
136 N. 12th St. Philadelphia 7, Penna.

## TIRE REPAIRS
In all sizes of tractor, truck, wheelbarrow, passenger or 1800x24 tires.
An Equa-Flex "Sectional" repair constructed in your tire is guaranteed. Best results and prompt service!
It is a fact that we do repair run flat tires, passenger and truck, without a reliner!
**WALLACE TIRE SERVICE, Inc.**
2320 S. Michigan Ave. Chicago, Ill.

## FOR SALE

Brooks Load-Luggers, latest model CH-200, two yard buckets. Practically new. $750.00

Dempster Dumpster, latest model 200-LF, two yard buckets mounted on International 2-ton 39. Perfect condition. $1750.00

No. 206 P. & H. Gasoline Crane-Dragline, 35 ft. boom. Gone over. $2500.00

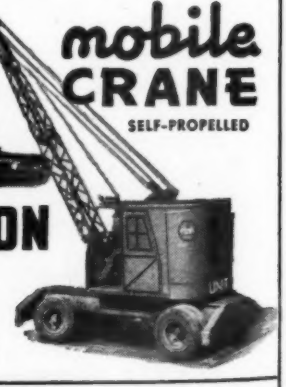
Practically new 15x24" Diamond Portable Crushing plant with Cummings Diesel engine, elevator, screen. Been used 20,000 tons only. $5000.00

**M. WENZEL**
2136 Jefferson Kansas City, Mo.

AN ESTABLISHED SELLING ORGANIZATION is interested in taking on new lines on a commission basis. Territory covered, Pennsylvania, New Jersey, Delaware, Maryland, New York and the District of Columbia. Twenty years' acquaintance with our accounts and will furnish references as to our ability from manufacturers we now represent on the above mentioned basis. Address Box 500, Roads and Streets, 330 South Wells Street, Chicago 6, Ill.

## ASPHALT and TAR KETTLES
*FIRE PROOF—OIL BURNING*
*Hand and Motor driven spray.*
*Many sizes. Write for catalog.*
Elkhart **White Mfg. Co.** Indiana

## UNIT 5 TON mobile CRANE
SELF-PROPELLED



Powerful, fast-stepping Mobile Crane . . . one-man operated . . . for "on and off" highway operations . . . simple to operate . . . (eliminates cut-up terrain, mutilated concrete docks and runways.)

Write for particulars.

**UNIT CRANE & SHOVEL Corp.** MILWAUKEE 14 WISCONSIN

## New Heil Appointments

The Heil Co., Milwaukee, Wis., has appointed William E. Simons sales manager of the Body and Hoist Division of the company. Mr. Simons was with Ford Motor Co. for over 26 years, serving as manager of branches throughout the country. He resigned as Deputy Regional Director of W. P. B. to become associated with The Heil Co., in October, 1943. Since then he has been in charge of the Materials Division and has spent considerable time studying manufacturing and service problems. Former Body and Hoist Sales Manager, Earl C. Gilmore, has been advanced to assistant treasurer of The Heil Co.

W. E. Simons

▼

## New Distributors for Briggs Clarifier

The Briggs Clarifier has made two recent distributor appointments. These are: the M. N. Dannenbaum Co., 2409 Wayside Drive, Houston 12, Tex., whose territory will be East Texas and the Gulf Coast; and McGregor & Werner, Inc., 1411 20th St., N.W., Washington, D. C., whose territory will be Maryland, Delaware and the District of Columbia.

▼

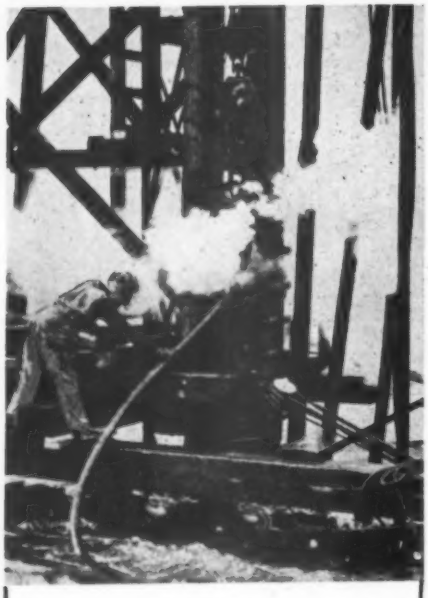
## H. F. Howard Now With Fruehauf

Harvey C. Fruehauf, President Fruehauf Trailer Co., has announced the appointment of H. F. Howard as vice-president in charge of manufacturing. Mr. Howard, who has been general plant manager of Chevrolet Division Factories in Flint, Mich., for the past seven years will be in charge of manufacturing operations at all Fruehauf plants and will make his headquarters in Detroit.

▼

## New Distributor for Pioneer

Pioneer Engineering Works, Inc., Minneapolis, Minn., has announced the appointment of the Martin-Roasa Tractor & Equipment Co., Cedar Rapids, Ia., as distributors for the territory of eastern Iowa and ten counties in northeastern Missouri.





# Index to Advertisers



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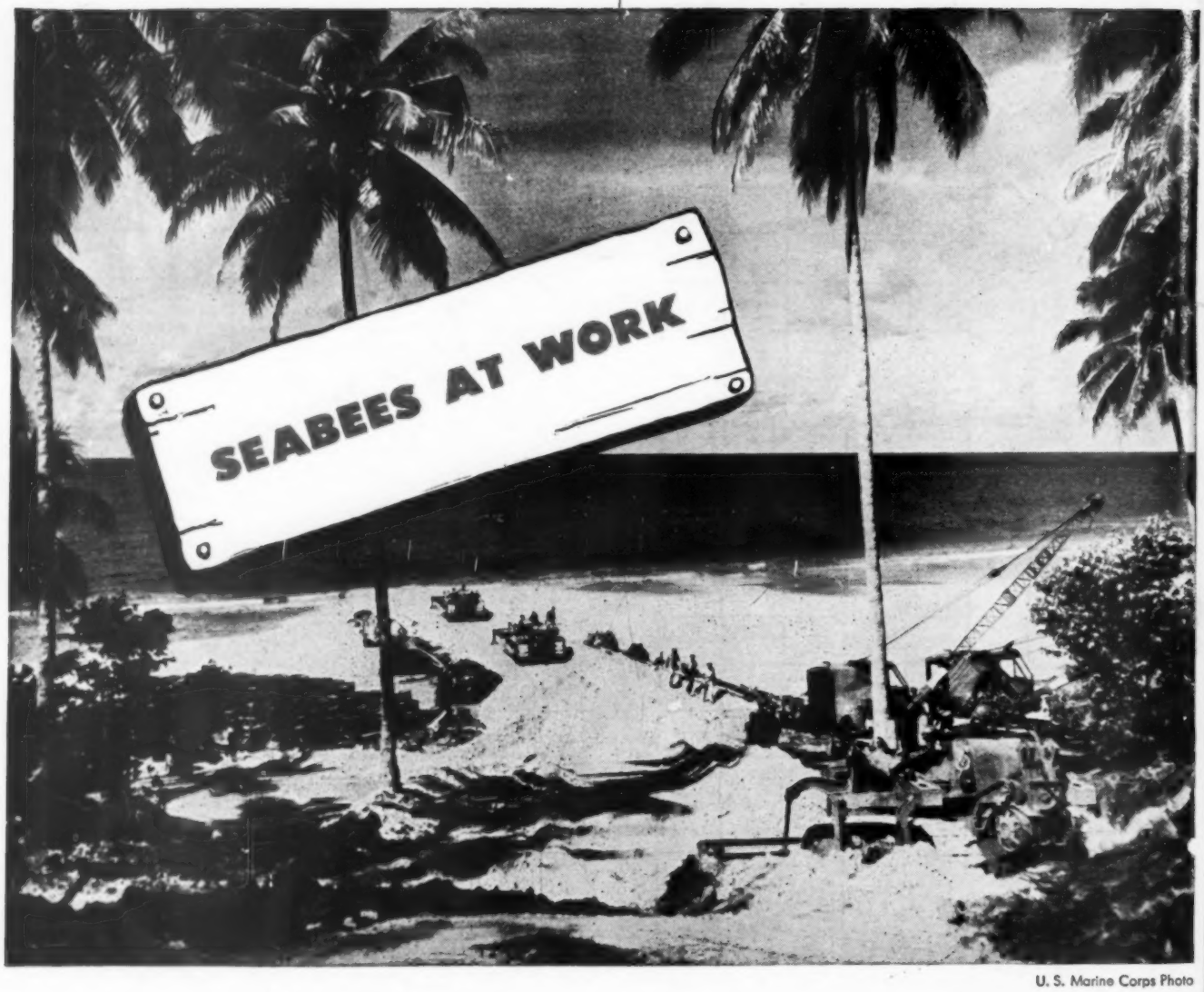


U. S. Marine Corps Photo

EQUALLY expert with bulldozer or bazooka, road roller or rifle, the Seabees have proved themselves the seventh wonder of the construction world. At this remote Pacific outpost, they rush a road through to the site where a dock will be built.

Just as important as the efficient Seabees in the successful building of vital bases is the efficient operation of their construction equipment. And whether on a tropical Pacific island or right here at home, efficient operation in large measure depends on effective lubrication—Texaco.

*Texaco Alcaid, Algol* or *Ursa Oils* in air compressors, for example, assure wide-opening, tight-closing valves, free piston rings, open ports, clear lines, continuous air supply. They also assure maximum service life between overhauls, fewer repairs and replacements. Their use is world-wide.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd St., New York 17, N.Y.

**THEY PREFER TEXACO**

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TEXACO

# TEXACO Lubricants and Fuels

## FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ★ METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOON